POPULAR Computing WEEKLY

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This Week

★STAR Santa Claus on Spectrum and Dragon **GAME**

News Desk

Members of the BMMG outside No 10 Downing Street

Sinclair critical of BMMG stance

SINCLAIR Research has reacted critically to last week's proposals to protect the UK micro-computer industry from 'unfair' foreign competition put forward by the British Microcomputer Manufacturers' Group.

Instead the company — a member of the group — has proposed its own help formula.

The main BMMG proposal — a twelve-month embargo on US and Japanese micro-computer imports — is rejected by Sinclair. Clive Sinclair, in a written statement, said: "We do not believe that the BMMG package represents the most helpful way forward. Essentially it seeks to solve problems — caused by

Continued on page 5

Independent authority for cable tv

THE government has decided to set up an independent authority to govern the introduction of cable television in Britain.

The new authority, which will be completely separate from the Independent Broadcasting Authority, was announced by Information Technology Minister Kenneth Baker during a Commons debate on cable television. A White Paper detailing the authority's terms of reference will be released early next year.

Kenneth Baker also revealed the government's preference for a 'switched star' system as opposed to 'tree and branch'. He conceded that this option would be more expensive but said it had more potential for interactive communication.

The government also expressed a preference for fibre optic cable as against the conventional copper co-axial cable.

Classified

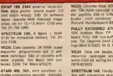


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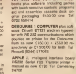
ATARI 400, 32K, mint condition, includes programme recorder, manuals, joystick and several games programmes. £275. Tel 041-959 4455

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FULLY EXTENDED ATOM 12K + 16K, toolbox Rom, FP Rom, colour board, PSU, VIA, bus buffers. £200.00 ono. Tel Daytime 0494 23699, evenings 0644 216323. Mr G Marsh

VIC20 Data, six books, 16K super expander cartridges and cassettes worth £550.00, selling for £300.00. Tel 0978 822605

SPECTRUM 16K. Hardly used, still in box with magazines plus two cassettes. £130.00 ono. Tel Basildon 553963 (David Edwards)



PET 4008 New Rom, 8K, manual, books plus software including games with touch-sensitive controls, programs aid and assembler, cassette deck, original packaging. £400.00 ono. Tel 0702 558414

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APPLE II, intelligent interface board RS232 Serial, T80 Transtel printer + manual, as new £110. Tel Camberley 24702

Continued on page 32

BATTLESTAR IS COMING



16/23 December 1982 Vol 1 No 35

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How to submit articles
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All submissions should be typed and a double space should be left between each line Please leave wide margins

Programs should whenever possible be computer printed

We cannot guarantee to return every submitted article or program so please keep a copy If you want to have your program returned you must include a stamped addressed envelope

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish although we will always try our best to make sure programs work

This Week

Editorial

Christmas is traditionally a time for looking back over the past year and reflecting on the various successes and disappointments However, rather than bore you with a list of achievements and failures that is all too familiar, I would prefer to concentrate on some of the wider implications of cheap, readily available, micro-computers.

The micro revolution is undoubtedly upon us, though it has arrived almost unnoticed Like the motor car, the micro will change the way in which we live forever But, as with the motor car, it is difficult to predict what will be happening in two or three years time, never mind twenty or thirty

What does seem certain, however, is that more people than ever before will own or have access to a computer At this time last year some 200,000 people in Britain owned their own micros The comparable figure this year is at least 600,000 and probably much greater By next year the figure is likely to be in the millions

Just as the industrial revolution brought unparalleled opportunities, so the micro revolution is opening up a whole new world for our generation It is up to us to make the most of it

A Merry Xmas to all our readers

Next Thursday

Following our combined issue this week, there will be no issue of *Popular Computing Weekly* next week — but we will be back with another action packed edition on December 30

Mike Grace will take another look at some of the latest software for the Vic20 while David Angler will present a disassembler program for all 6502 based machines.

Sinclair's way

Continued from page 1

regulations — with new regulations. It would be more in keeping with the spirit of the present government to dismantle existing controls which inhibit initiative and growth."

Three courses of action are proposed by Sinclair Research.

- Present government procurement policy should be overhauled to ensure equal opportunities for UK manufacturers.
- The present 17 percent duty on many imported electronic components should be substantially reduced. It compares unfavourably with the 6-8 percent duty on fully-assembled products imported, and discourages UK manufacture.
- Government should exert maximum diplomatic pressure to remove hidden UK export controls. According to the Sinclair statement many foreign governments regularly breach EEC or GATT international trade regulations.

Sinclair Research is understandably not keen to see any import restrictions applied to the UK because of possible reprisals by other countries. A substantial proportion of the company's computer production is exported. The ZX81 sells well in the competitive Japanese market and the new Timex 1000 is much sought-after in the US.

Spectrum goes on sale at W H Smith

THE Sinclair ZX Spectrum is now available over the counter at selected W H Smith stores. Previously, it was only available by mail order.

W H Smith, which already stocks the ZX81, began selling the Spectrum at 65 branches last week.

Stewart Binnie, W H Smith merchandise controller, said: "Demand exceeds supply at present, but we anticipate large deliveries as Christmas approaches. First deliveries of the 16K Spectrum begin this week to 65 branches which already have the 48K Spectrum.

"Initial quantities of Spectrum software are now available."

Sord takes the plunge

THE SORD M5 computer goes on sale in the UK in late February 1983.

It will sell both through major high-street stores and the dealer network that the company has been developing since opening its UK office a little over two months ago.

Priced at £169 the M5 machine is supplied with power pack, leads and three Rom cartridges — Basic I and two games cartridges. Other games cartridges, FALC (a version of Sord's Pips for the M5) and joysticks will go on sale simultaneously but so far no prices have been agreed.

The Z80-based M5 with 8K Rom, 4K Ram and 16K video Ram went on sale in Japan in October and America in November.

January computer show

LONDON Home Computer Show will be held at the Royal Horticultural Society Old Hall in Vincent Square, London from 7 to 9 January, 1983. The show will be open from 10 am to 6 pm on Friday and Saturday and from 10 am to 4 pm on Sunday.

The main emphasis of the show will be on microcomputers selling for less than £200 — although material for the Lynx and BBC machines will be included. Entry will cost around £1.50.

More details from Neil Johnson (01-437 1002).

Vics use Pet peripherals

INTERPOD is a new unit which allows Pet peripherals to be used by either the Vic20 or Commodore 64 machines.

The device attaches to the serial bus of the Vic20 or 64 and provides IEEE and RS232 interfaces. So these machines need not be restricted to using the 174K of the Vic 1540 single disc drive.

Use of a wide range of peripherals including the Pet 4040 (½M), 8050 (1M) and 9090 (10M) disc units is possible. The Interpod has two IEEE ports so a printer or graph-plotter can also be used. The RS232 output has selectable baud rate (between 50 and 7,200 baud), parity and device numbering.

Mark Clark from Oxford Computer Systems who produce the unit explained: "The Interpod just plugs straight in, and no alteration of the Vic software is necessary to operate it. As long as there is no device number clash, up to seven disc drives can be connected at the same time. In fact, up to 28 devices can be driven simultaneously, using the Interpod unit."

Interpod is available from Oxford Computer Systems Ltd, The Old Signal Box, Hensington Road, Woodstock, Oxford, priced at £125 plus VAT.

Talk dispenser

COCO-COLA is to introduce video-game vending machines in the US.

The company plans to install new machines which give customers a free play of a video game with every purchase made. The dispensers give a choice of two games, played on built-in screens, which last for about 30 seconds.

The new selling strategy is a follow-up to the introduction last year of talking Coke dispensers.

Ace gets users group

A JUPITER Ace Users group has been formed by the Brighton-based software house, Remsoft.

Members paying the £7 subscription fee will receive three issues of a newsletter including hints, tips and special offers. John Noyce, co-founder of the group said: "The Ace is a lovely little machine, but it will need programs for its current unexpanded 3K form before users can fully benefit from its uniqueness."

As of January, production of the Jupiter Ace in Bury St Edmunds is being stepped up to 3000 units per month.

Commodore profits up

COMMODORE sales for the year to June 30, 1982, have risen to over £189m — 63 percent up on the previous year.

The company has also announced profits up to £25.2m from last year's total of £15.5m.

Sales of microcomputer systems now account for 75 percent of the company's sales — the Pet range continues to sell well and the Vic20 has recently become the world's best selling microcomputer. Commodore UK is one of the company's largest divisions, accounting for 25 percent of world sales.

By far the biggest growth of micro sales was seen in the US, where an increase of some 190 percent was seen. Over 800,000 of the 1m Vic20 machines so far sold were bought in America. In the rest of the world microcomputer sales rose by a comparatively modest 34 percent.

In the UK the upward trend seems set to continue. British sales in the first quarter of 1982-3 showed a 120 percent increase over the same period in 1981-2.

Everything but a computer or the kitchen sink

A NEW wristwatch from Seiko incorporating both a 3cm tv screen and an FM radio is to go on sale in Japan this month — costing around £267.





Some talk of a gift horse

I am writing to you unfortunately to complain I have just had a personal computer bought for me by my parents Unfortunately, due to the fact that it was for my birthday, they did not consult me about what make I wanted

It is an Atari 400 and I am very pleased with it, but I have been trying to get some of your programs to run on it I have not met with any success even when trying to convert it over to Atari 400 basic

I have been collecting your magazine since No 2 and am extremely disappointed to see you do not print programs for my computer It is a very popular computer and it has been featured in other magazines Please could you print some games occasionally that will work on it and by this will attract a lot more readers

Paul Harvey
16 Castle Road
Epsom
Surrey KT18 7NZ

We have been expanding our coverage recently to include a slightly wider range of micros Our first review of Atari software was published in our December 9 issue

We will be publishing a few Atari games in the New Year, depending on demand.

Goodwill and the agent

As service agents for W H Smith & Son Ltd, we feel a reply is needed in respect of the letter you published from Mr Alan Jones in your November 25 issue

As long established service agents for various organisations we have always operated on the basis that *damage* to a product cannot be covered by a guarantee, a fairly common principle After all, guarantees are for protection against manufacturing defects, not subsequent damage

The ZX81 keyboard can be damaged by pressing it with a hard object and in the past we have felt justified in charging for replacing these where damage was obvious However, W H Smith & Son Ltd have asked that we now adopt a more lenient attitude towards their customers As a result, such repairs are now being carried out at no charge and are being returned with a pictorial explanation to avoid a recurrence

Unfortunately, Mr Jones's repair took place before this instruction from W H Smith was given, although we still maintain there was nothing unfair about our actions

He will be receiving a refund and as such will be benefiting from his suppliers' (W H Smith) desire to go beyond the requirements of the *Sale of Goods Act* to ensure their customers' goodwill

In this particular instance, the keyboard was so badly damaged that this was noticed and recorded by our clerical staff before being passed to our engineers

M H Wright
Interservice Electronics Ltd
87-91 Park Street
Southend-on-Sea
Essex

From No byte to byte mode

In reply to K Robertson's letter in Vol 1 No 29, I can confirm that the listing, as published, works It looks as if his program has gone from No byte mode to byte mode Addresses 66 to 72 should have been

66 or L	181 ASN
67 JRNZ,72	32
	37
69 INC (IY+64)	253 CLEAR
	52 4
	64 @
72 PUSH BC	197 OR
	# in Byte mode

E A Kissack
43 St Georges Road
Wittering
Peterborough
Cambs

Confused by error messages

The Vic20 must surely be one of the most bug-free computers available That said and although the Vic20 file handling is excellent, it can become a little confusing when faced with error messages that are unknown even to Commodore Try these short examples

Enter VERIFY "",2 This gives *"Illegal device number"* How about *For H = 3 to 255 Open H,H Next* giving *"Too many files"*

Run this *10 Open 1,0 Input 1,K* then type a string and *Return* A *"File data"* error occurs instead of *"Bad data"* listed in the manuals Enter *Verify* "",6 This gives *'Missing file name"* Also, when the Vic encounters an end of tape marker, it replies with *"Device not present"* error instead of *"File not found"*

Maybe these anomalies do not occur with all versions of the Vic, but they do with my early Japanese machine Now let us see if anyone can find any more Vic20 error messages

Colin McCormick
29 Randwick Park Road
Plymouth
Devon PL9

Dragging it out by the roots

Thank you for starting the Dragon page As the sometimes proud owner of a Dragon 32 and being a novice at programming/using micros, I was beginning to despair and slowly losing more hair!

I am now waiting with bated breath for the manual of that "well-known colour computer" (why couldn't you say Tandy?), in the hopes of becoming enlightened

I have just finished reading a piece in an Australian magazine about the other machine and there are two points which will be of interest and perhaps use to other owners

1 The maximum size of an array used with *Get/Put* commands is 1,400 elements
2 If you want to increase the speed of this already fast beast, use *Poke* 65495,0 It really does work but be warned — do not use cassette statements and be prepared for *Sound* and *Play* commands to be rather strange, although still acceptable as sound effects

The problem with the speed increase is that the only way I have found of turning it off is by manually resetting the machine! *Peeking* the location returns a value of 126 — always I have tried *Poking* it with all sorts of numbers, but it always says it contains 126 This is a shame because, if resettable, it would provide a simple method of having two levels of speed in games

I have tried using it on the *Flying Saucers* game (*Popular Computing Weekly*, November 4) and it makes it very difficult to win (I think my wife is going to see her solicitors) Perhaps someone could solve this for me and allow my hair to grow again!

Dickon Smith
Flat 1
Bridge Garage
Main Street
Grove
Wantage OX12 7HR

Feetening the donkey's head

In your magazine dated October 28, there was a program called "Donkey" for the ZX81 I would like to enter this program, but the first couple of lines have been missed out So, please could you send me a copy of the complete program

Tim Read
23 Laurel Drive
Bradwell
Great Yarmouth
Norfolk NR31 8PB

You are quite correct Somehow we inadvertently left out the first three lines of the program The missing lines are

```
1 LET S=0
10 POKE 16418,0
11 LET G= 1000
```

A rather higher score

Re Stewart Douglas — *Popular Computing Weekly* November 4

Sorry Stewart, but since I saw the *Scramble* program and typed it in, I have played it regularly My highest score is just over 4,000 points with over 220 miles travelled I regularly score over 2 500 points I have also typed in a high score, a detailed account of score and a high score for travelling the greatest distance all in 3 5K on my Vic20

M N Arnss
79 Coldy Road
Aintree
Liverpool L9 4RZ

If you have an opinion you want to express or have spotted an error that needs correcting, write to Letters, Popular Computing Weekly, *Hobhouse Court 19 Whitcomb Street, London WC2*

Santa Claus

A new game for 16K Spectrum and Dragon 32 by David Lawrence

Many of the most intriguing games that can be played on a micro depend for their fascination on the effective simulation of a very natural phenomenon like the curve of the thrown ball. This simple Christmas game depends upon the simulation of presents thrown from a height into chimneys of varying elevation. In a flush of the Christmas spirit the game is offered for both the 16K Spectrum and the Dragon 32.

It needs only a very cursory examination to see that the game is, in fact, very short in terms of the sections needed to actually play. But, in both versions these parts are almost doubled by the lines needed to provide the instructions and to set up the simple graphics initially. It is in relation to the graphics that the major differences arise between the two versions.

In the Spectrum game, the chimneys down which presents are to be tossed are each made up of four user defined characters, loaded into the memory by the module at line 3000. Since the user defined character facility is not available on the Dragon, and to *Draw* the 98 chimneys would be too slow, the five different chimney types (actually dice faces) are loaded into arrays using the *Get* command and simply printed to the screen using *Put*. This procedure is made more cumbersome by the fact that a separate array must be declared for each of the five types of chimneys.

Once the graphics are set up, the Spectrum is far more economical in the manner in which it can print the graphics to the screen in the module at line 3500. On the other hand, the Dragon's flexible *Draw* command allows small touches like the representation of the presents remaining by tiny 4*4 pixel squares.

Both versions of the game share some simple calculations, relating to direction of throw and speed (modules at 2000 and 2200) and the rate of descent compared with horizontal distance covered (2500).

In both versions the game is played on a screen completely devoid of text. The chimneys are displayed in the form of an 11*9 grid of dice faces. Each turn begins with a line being drawn around the grid starting in the bottom left-hand corner. The line can be stopped at any point by pressing a key — this determines the direction of the throw from the centre of the screen.

This is followed by the generation of a horizontal line between two markers on either side of the screen. This line, too, is stopped by pressing any key — it represents the initial velocity of the throw. The meaning of the actual values represented will only become apparent as you play.

Having entered the direction and the velocity, the horizontal track of the throw will begin to be plotted on the grid. On the right of the screen, a line descending from the top indicates the height of the present as it falls. Six marks at the bottom right of the screen indicate the floor and the relative heights of the five chimney types.

If the horizontal track is over a type five chimney when the height line hits the top marker, then the present has landed in that chimney. Chimneys can only be entered from the top, so that if the height marker is at less than the level of a type five chimney when the horizontal track tries to enter a type five square, the present crashes and is lost.

Each time a present enters a chimney which has not been entered before, two things happen. Firstly, the player's score is incremented by six minus the type of the chimney — that is to say the lowest chimneys score highest. Secondly, on each subsequent turn the representation of that chimney will be inverted and will not score if it is entered on subsequent turns.

One final complication is that the height from which the presents are thrown decreases with every second turn. This makes it increasingly difficult to hit low chimneys on the outside of the grid which are masked by higher chimneys. Such inaccessible chimneys need to be attempted early on, as you have only 40 presents per game.

The object of the game is to get as many points as possible with the 40 presents, it's as simple — and as difficult — as that.



Commentary

The lines of both versions are untidily numbered since to renumber either or both would disturb the correspondence between the line numbers of the two versions.

Lines

1000 The module beginning at this line simply distributes tasks among the other sections of the program during play and displays the score at the end.

1200 This module sets up the array of chimneys. Note that in the Dragon version you cannot enter this module by means of a *Gosub* since the *Return* destination is lost when the memory is cleared.

2000 The purpose of this module is simply to draw the direction indicator line around the array of chimneys.

2200 The angle of the direction in relation to the centre of the grid is calculated. Lines 2250 and 2280 simply determine the relative proportions of the increments to horizontal and vertical co-ordinates every time a point is plotted on the trajectory. Whichever is the greater is made equal to 1 so that when the trajectory comes to be printed by a loop, every repetition of the loop plots (or *Psets*) a fresh pixel.

2310 The loop commencing here draws the line indicating the velocity of the throw.

2500 In this module the trajectory of the present is plotted. Various tests are performed to ensure that the trajectory has not passed off the screen and that the present has not landed. The variables X1 and Y1, calculated by the module at line 4000, indicate the array element in A which is represented by the current screen position X2

and X2 Y2 simply record the array element in which the last point fell in. If a landing is made and X2 Y2 are not equal to X1 Y1 then the present has actually crashed into the wall of a chimney. The formula at 2580 simulates the effect of gravity on the present. If a valid landing is made the value of the array element is multiplied by −1.

3000 (Dragon) In this module three things happen. Firstly five arrays are dimensioned to hold the dice faces. This is clumsy but unfortunately a three-dimensional array of the form B(5 16,16) is not permitted. Secondly strings are defined which will draw the square surrounding the dice face and the dots. Thirdly the five combinations are drawn on to a graphics page (they are not seen on the screen since we have not called up the graphics screen yet) and put into the five arrays using *Get*. Note the use of the qualifier G in the use of the *Get* command — this is because the resulting pictures stored in the arrays will be sometimes printed in inverse form and tend to produce unexpected results if the optional G is not used.

3000 (Spectrum) A fairly standard module for loading user defined characters into the memory. Each group of four data lines defines a single dice face.

3000 (Dragon) In this module the graphics screen is cleared of the dice faces which were placed on to it in the last module and called up. Dice faces corresponding to the value in each element of the array A are *Put* on to the screen at 16-pixel intervals horizontally and vertically.

3500 (Spectrum) A much simpler module since it is possible to manipulate the character to be printed by reference to the value contained in the relevant element of the array A without recourse to *On Gosub*.

4000 This module simply calculates the array element corresponding to the current position of the present on the screen.

Santa on Spectrum

```
1005 REM ************************
1010 REM MAIN PROGRAM
1020 REM ************************
1030 CLS : PRINT : PAPER 2; INK
7; "  SANTA'S POSTAL SERVICE"
1040 PRINT "DO YOU WANT INSTRU
CTIONS (Y/N)?": INPUT Q$: IF Q$=
"Y" THEN GO SUB 4500
1090 CLS : GO SUB 1200
1095 GO SUB 3000
1097 FOR H=300 TO 100 STEP -10
FOR G=1 TO 2
1100 GO SUB 3500
1110 GO SUB 2030
1140 IF INKEY$="" THEN GO TO 114
0
1150 CLS : NEXT G: NEXT H
1160 CLS : PRINT : PAPER 2; INK
7; "  SANTA'S POSTAL SERVICE"
1170 PRINT "   YOUR SCORE WAS ",S
CORE
1180 STOP
1200 REM ************************
1210 REM INITIALISE
1220 REM ************************
1230 DIM A(9,11)
1300 FOR I=1 TO 9: FOR J=1 TO 11
1310 LET A(I,J)=INT (RND*5)+1
1320 NEXT J: NEXT I
1330 LET X2=0: LET Y2=0
1340 LET SCORE=0: LET A(0,0)=0
1350 RETURN
2000 REM ************************
2010 REM DETERMINE ANGLES
2020 REM ************************
2030 LET SANTA1=111: LET SANTA2=
08
2060 LET X=0: FOR Y=10 TO 174
2070 PLOT X,Y
2075 IF INKEY$<>"" THEN GO TO 22
00
2080 NEXT Y
2090 FOR X=0 TO 216
2100 PLOT X,Y
2110 IF INKEY$<>"" THEN GO TO 22
00
2120 NEXT X
2130 FOR Y=170 TO 17 STEP -1
2140 PLOT X,Y
2150 IF INKEY$<>"" THEN GO TO 22
00
2160 NEXT Y
2170 FOR X=216 TO 0 STEP -1
2180 PLOT X,Y
2185 IF INKEY$<>"" THEN GO TO 22
00
2190 NEXT X
2200 REM ************************
2210 REM ANGLE AND VELOCITY
2220 REM ************************
2230 FOR I=1 TO 200: NEXT I
2240 LET H1=X-SANTA1: LET V1=Y-S
ANTA2
2250 IF ABS V1>=ABS H1 THEN LET
V2=SGN V1: LET H2=ABS (H1/V1)*SG
N H1
2260 IF ABS H1>ABS V1 THEN LET H
2=SGN H1: LET V2=ABS (V1/H1)*SGN
 V1
2310 FOR U=0 TO 240
2320 PLOT U,0: IF INKEY$<>"" THE
N GO TO 2400
2330 NEXT U
2350 RETURN
2500 REM ************************
2510 REM PLOT COURSE
2520 REM ************************
2525 LET T=(255-U)/1000
2530 FOR I=1 TO 196
2540 LET X=INT (SANTA1+INT (I*H2
)): LET Y=INT (SANTA2+INT (I*V2)
)
2550 IF X<0 OR X>255 OR Y<0 OR Y
>170 THEN RETURN
2555 PLOT OVER 1;X,Y: GO SUB 400
0
2560 LET H3=H-80*(T*I)↑2: IF H3<=
0 THEN RETURN
2600 IF X1=X2 AND Y1=Y2 AND X1<>
0 AND Y1<>0 THEN IF H3<A(Y1,X1)*20 AND A(Y1,X1)>0 THEN LET S
CORE=SCORE+6-A(Y1,X1): LET A(Y1,
X1)=A(Y1,X1)*-1
2610 IF X1<>0 AND Y1<>0 THEN IF
H3<20 A(Y1,X1)*20 THEN RETURN
2615 LET Y2=Y1: LET X2=X1
2620 IF H3/2<=170 THEN PLOT 255,
170: DRAW 0,-(170-H3/2)
2700 NEXT I: RETURN
3000 REM ************************
3010 REM CHIMNEY SQUARES
3020 REM ************************
3030 RESTORE : FOR I=1 TO 20: FO
R J=0 TO 7: READ A: POKE USR CHR
$ (143+I)+J,A: NEXT J: NEXT I: R
ETURN
3036 REM ************************
3040 DATA 255,128,128,128,128,12
8,128,128
3050 DATA 255,1,1,1,1,1,1,255
3060 DATA 128,128,128,128,128,12
8,128,255
3070 DATA 128,1,1,1,1,1,1,255
3080 REM ************************
3090 DATA 255,128,128,128,128,12
8,128,128
3100 DATA 255,1,1,1,1,1,1,1
3110 DATA 128,128,128,128,128,12
8,128,255
3120 DATA 1,1,1,25,25,1,1,255
3130 REM ************************
3140 DATA 255,128,128,152,152,12
8,128,128
3150 DATA 255,1,1,1,1,1,1,1
3160 DATA 128,128,128,128,128,12
8,128,255
3170 DATA 1,1,1,25,25,1,1,255
3180 REM ************************
3190 DATA 255,128,128,152,152,12
8,128,128
3200 DATA 255,1,1,25,25,1,1,1
3210 DATA 128,128,128,152,152,12
8,128,255
3220 DATA 1,1,1,25,25,1,1,255
3230 REM ************************
3240 DATA 255,128,128,152,152,12
8,128,128
3250 DATA 255,1,1,25,25,1,1,129
3260 DATA 128,128,128,152,152,12
8,128,255
3270 DATA 129,1,1,25,25,1,1,255
3500 REM ************************
3510 REM PRINT CHIMNEYS
3520 REM ************************
3530 FOR I=1 TO 9: FOR J=1 TO 11
3535 LET INV=0: IF A(I,J)<0 THEN
 LET INV=1
3538 IF I=5 AND J=6 THEN GO TO 3
570
3540 LET CH=ABS A(I,J)*4
3550 PRINT INVERSE INV;AT I*2-1,
J*2+1;CHR$ (143+CH-3);CHR$ (143+
CH-2)
3560 PRINT INVERSE INV;AT I*2,J*
2+1;CHR$ (143+CH-1);CHR$ (143+CH
)
3570 NEXT J: NEXT I
3600 FOR I=0 TO 8: PLOT 250,I*10
: DRAW 5,0: PLOT 250,I*10+1: DRA
W 5,0: NEXT I
3610 FOR I=1 TO (H-100)/5+3-0: P
LOT 0,I*0: DRAW 0,0: NEXT I
3620 PLOT 0,0: DRAW 0,0: PLOT 0,
0: DRAW 0,0: PLOT 240,0: DRAW 0,
0: PLOT 241,0: DRAW 0,0
3700 RETURN
4000 REM ************************
4010 REM CALCULATE LANDING
4020 REM ************************
4030 LET X1=INT ((X-23)/16)+1
4040 LET Y1=INT ((167-Y)/16)+1
4050 IF X1>11 OR X1<1 THEN LET X
1=0
4060 IF Y1>9 OR Y1<1 THEN LET Y1
=0
4100 RETURN
4500 REM ************************
4510 REM INSTRUCTIONS
4520 REM ************************
4530 CLS : PRINT PAPER 6; INK 7;
" SANTA'S PARCEL DELIVERY SERVICE
"
4540 PRINT "IS IN DEEP TROUBLE."
4550 PRINT "THE PARCELS ARE LAT
E AND THE     REINDEER ARE RUNNIN
G OUT OF      PUFF. YOU CAN HELP
BY DELIVERINGONE BATCH OF PARCEL
S. SINCE YOU ARE INEXPERIENCED Y
OU WILL NOT   GET AROUND THE WHOL
E TOWN SO     PLEASE CONCENTRATE
ON THE POORERHOUSES--THE ONES WI
TH THE LOWER  CHIMNEYS."
4560 PRINT "   TO HELP YOU, THE TO
WNSFOLK HAVE  NUMBERED THEIR CHIM
NEYS LIKE     DICE--THE LOWER THE
 NUMBER THE   LOWER THE CHIMNEY."
4570 PRINT "  PRESS A KEY WHEN YO
U WANT TO     KNOW MORE"
4580 IF INKEY$="" THEN GO TO 458
0
4590 CLS : PRINT "TO DESPATCH A
 PARCEL YOU HAVE TOPRESS A KEY W
N THE CONTROL BOARDWHEN THE AUTO
MATIC SCANNER IS   INDICATING TH
E RIGHT DIRECTION."
4600 PRINT "  THE SCANNER IS A LI
NE WHICH      RACES ROUND THE TOW
N--YOU ARE ABOVE THE SPACE IN TH
E MIDDLE OF THE TOWN"
4610 PRINT "  HAVING SET THE DIRE
CTION YOU     MUST SET THE STRENG
TH OF THE     LOB WHILE THE LAUNC
H INDICATOR   MOVES ACROSS THE BO
TTOM OF THE   SCREEN."
4620 PRINT "  THIS TOO IS DONE BY
 SIMPLY       PRESSING A KEY."
4630 PRINT "  PRESS ANY KEY FOR M
ORE"
4650 IF INKEY$="" THEN GO TO 465
0
4660 CLS : PRINT "THE OTHER HEL
P YOU HAVE IS A    HEIGHT INDICA
TOR WHICH SHOWS THEHEIGHT OF THE
 PRESENT AS IT     FALLS,TOGETHE
R WITH THE HEIGHT  OF THE 6 TYPE
S OF CHIMNEY."
4665 PRINT "  UNFORTUNATELY-AS ME
NTIONED-THE   REINDEER ARE GETTIN
G TIRED. THISMEANS THAT YOU ARE
LOSING HEIGHT--MAKING IT HARDER
TO LOB OVER   THE HIGHER CHIMNEYS
--SO GET      INACCESSIBLE CHIMNE
YS FIRST."
4668 PRINT "  TO GET A PRESENT IN
 TO A CHIMNEYIT MUST ARRIVE ON T
HE SQUARE     OCCUPIED BY THE CHI
MNEY AT ABOVETHE CHIMNEY HEIGHT
AND THEN FALLIN."
4670 PRINT "  PRESS ANY KEY FOR M
ORE"
4680 IF INKEY$="" THEN GO TO 468
0
4690 CLS : PRINT AT 0,0; "TO HELP
 SANTA ASSESS YOUR WORK  YOU ARE
 GIVEN A SCORE AT THE ENDOF YOUR
 DELIVERIES. THE MORE LOWCHIMNEY
S YOU MANAGE, THE HIGHER YOUR SC
ORE. GOOD LUCK."
4695 PRINT "  PRESS ANY KEY TO ST
ART"
4697 IF INKEY$="" THEN GO TO 469
7
4700 CLS : RETURN
```

Santa on Dragon

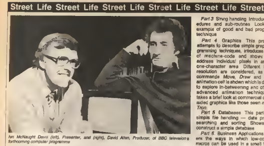
```
1 GOTO5
2 FORI=1TO3:FORJ=1TO2000:NEXTJ:CSAVE
  "SANTA":NEXTI:STOP
5 REM
1000 REM***************************
1010 REM MAIN PROGRAMME
1020 REM***************************
1030 CLS:PRINT @ 35,"SANTA'S POSTAL
     SERVICE"
1035 PRINT @ 67,STRING$(22,CHR$(181))
1040 PRINT:INPUT "DO YOU WANT INSTRUCTIONS
     (Y/N) ";Q$:IF Q$="Y" THEN GOSUB 4500
1090 CLS:GOTO 1200
1095 GOSUB 3000
1097 FOR H=300 TO 100 STEP -10:FOR G=1
     TO 2
1110 GOSUB 3500
1120 GOSUB 2000
1140 IF INKEY$="" THEN GOTO 1140
1150 CLS:NEXT G,H
1160 CLS:PRINT @ 35,"SANTA'S POSTAL SER
     VICE":PRINT @ 67,STRING$(22,CHR$(181))
1170 PRINT:PRINT "YOUR SCORE WAS ";SCORE
1180 STOP
1200 REM***************************
1210 REM INITIALISE
1220 REM***************************
1230 CLEAR:PCLEAR4
1280 DIM A(9,11)
1300 FOR I=0 TO 8:FOR J=0 TO 10
1310 LET A(I,J)=RND(5)
```

Turn to page 16



from page 9

```
1320 NEXT J,I
1330 LET H2=6 LET Y2=5
1340 LET SCORE=0 LET A(4 5)=0
1350 GOTO 1099
1400 GOTO 1095
2000 REM**************************
2010 REM DIRECTION
2020 REM**************************
2030 LET S1=119 LET S2=50
2060 LET X=16 FOR Y=175 TO 17 STEP -1
2070 PSET (X Y)
2080 IF INKEY$<>"" THEN GOTO 2200
2085 NEXT Y
2090 FOR X=16 TO 222
2100 PSET (X Y)
2110 IF INKEY$<>"" THEN GOTO 2200
2120 NEXT X
2130 FOR Y=16 TO 174
2140 PSET (X,Y)
2150 IF INKEY$<>"" THEN GOTO 2200
2152 NEXT Y
2170 FOR X=223 TO 18 STEP -1
2180 PSET (X,Y)
2190 IF INKEY$<>"" THEN GOTO 2200
2195 NEXT X
2200 REM**************************
2210 REM ANGLE AND VELOCITY
2220 REM**************************
2230 FOR I=1 TO 500 NEXT I
2240 H1=X-81 V1=Y-52
2250 IF ABS (V1)>=ABS(H1) THEN LET V2=SGN
     (V1) LET H2=ABS(H1/V1)*SGN(H1)
2260 IF ABS(H1)>ABS(V1) THEN LET H2=SGN
     (H1) LET V2=ABS(V1/H1)*SGN(V1)
2310 FOR V=0 TO 240
2320 PSET (V,3) IF INKEY$<>"" THEN GOTO
     2300
2330 NEXT V
2350 RETURN
2500 REM**************************
2510 REM PLOT COURSE
2520 REM**************************
2525 LET T=(255-V)/1500
2530 FOR I=1 TO 100
2540 LET X=INT(S1+INT(I*H2)) LET Y=INT
     (S2+INT(I*V2))
2550 IF Y<0 OR Y>191 THEN RETURN
2560 IF PPOINT(X Y)<>0 THEN PRESET(X,Y)
     ELSE PSET(X,Y)
2570 GOSUB 4000
2580 LET H3=H-5*(T*I)^2 IF H3<=0 THEN
     RETURN
2600 IF X1=X2 AND Y1=Y2 AND X1<>999 AND
     Y1<>999 THEN IF H3<ABS(A(Y1,X1))*20 AND
     A(Y1 X1)>0 THEN LET SCORE=SCORE+6-A(Y1,
     X1) LET A(Y1 X1)=A(Y1,X1)*-1
2610 IF X1<>999 AND Y1<>999 THEN IF
     H3<ABS(A(Y1 X1))*20 THEN RETURN
2615 LET Y2=Y1 LET X2=X1
2620 IF H3/2<=191 THEN LINE(252 0)-(252
     191-(H3/2)) PSET
2700 NEXT I RETURN
3000 REM**************************
3010 REM CHIMNEY SQUARES
3020 REM**************************
3030 PCLS PMODE4
3032 DIM B1(16 16) DIM B2(16,16) DIM B3
     (16 16) DIM B4(16 16) DIM B5(16,16)
3036 DIM B$(3) LET A$="BM1,1)R15;D15;L15;
     U15;
3040 LET B$(1)=A$+"BR7;BD7;R1;D1;L1"
3050 LET B$(2)=A$+"BR3;BD3;R1;D1;L1;BD7
     BR8;R1;D1 L1"
3060 LET B$(3)=A$+"BR11;BD3;R1;D1;L1;BD7;
     BL8;R1;D1;L1"
3070 DRAW B$(1) GET (1,1)-(16,16) B1,G
3080 DRAW B$(2) GET (1 1)-(16 16) B3,G
3090 DRAW B$(3) GET (1,1)-(16 16) B5 G
3100 PCLS DRAW B$(2) GET (1,1)-(16 16),B2,G
3110 DRAW B$(3) GET (1,1)-(16 16),B4 G
3200 RETURN
3500 REM**************************
3510 REM PRINT CHIMNEYS
3520 REM**************************
3525 PMODE4 PCLS SCREEN 1,1
3530 FOR I=24 TO 152 STEP 16 FOR J=32 TO
     192 STEP 16
3535 IF I=88 AND J=88 THEN GOTO 3570
3537 LET I1=(I-24)/16 LET J1=(J-32)/16
3540 ON ABS(A(I1,J1)) GOSUB 3710,3720,
     3730 3740 3750
3550 IF A(I1 J1)<0 THEN PUT(J,I)-(J+15,
     I+15),B1 NOT
3570 NEXT J,I
3600 DRAW "BM250,191" FORI=1 TO 8 DRAW
     "R5;U1;L5;BM+0 -10" NEXT I
3610 DRAW "BM5,186" FOR I=1 TO (N-100)/
     5+3-G DRAW "D2;R2;U2;L2BM+5,+0" NEXT I
3620 DRAW "BM0 0;D5;R1;U5;BM240,0;D5;R1;U5"
3700 RETURN
3710 PUT(J I)-(J+15,I+15) B1 PSET RETURN
3720 PUT(J I)-(J+15,I+15),B2,PSET RETURN
3730 PUT(J I)-(J+15,I+15),B3,PSET RETURN
3740 PUT(J I)-(J+15,I+15) B4 PSET RETURN
3750 PUT(J,I)-(J+15 I+15) B5,PSET RETURN
4000 REM**************************
4010 REM LANDING?
4020 REM**************************
4030 LET X1=INT((X-31)/16)
4040 LET Y1=INT((Y-23)/16)
4050 IF X1>10 OR X1<0 THEN LET X1=999
4052 IF Y1>8 OR Y1<0 THEN LET Y1=999
4070 RETURN
4500 REM**************************
4510 REM INSTRUCTIONS
4520 REM**************************
4530 CLS PRINT PRINT"SANTA S POSTAL SERVICE IS IN    DEEP TROUBLE."
4540 PRINT PRINT"DELIVERIES ARE OVERDUE AND THE  REINDEER ARE RUNNING OUT OF
     PUFF."
4550 PRINT PRINT"CAN YOU HELP?"
4560 PRINT INPUT "PRESS 'ENTER' TO FIND OUT MORE";Q$ CLS
4570 PRINT PRINT "IF YOU DO WANT TO HELP,SANTA    WILL GIVE YOU 40 PRESENTS TO
     DELIVER
4580 PRINT PRINT "SINCE THAT ISN'T ENOUGH TO COVERTHE WHOLE TOWN,THE IDEA IS THAT
     YOU TOSS THEM DOWN THE CHIMNEYS OF THE POOREST HOMES--YOU CAN   TELL THEM BECA
     USE THEY HAVE THE LOWEST CHIMNEYS."
4585 PRINT INPUT "PRESS 'ENTER' TO FIND OUT MORE.";Q$ CLS
4590 PRINT PRINT "TO HELP YOU IN YOUR TASK THE    TOWNSFOLK HAVE LABELLED THEIR
     CHIMNEYS LIKE DICE--THE LOWER   THE NUMBER THE LOWER THE       CHIMNEY."
4600 PRINT PRINT "IN TOSSING THE PARCELS YOU HAVE TWO FORMS OF CONTROL. YOU CAN
     CHOOSE THE DIRECTION AND THE    STRENGTH OF YOUR THROW.
4610 PRINT INPUT "PRESS 'ENTER'";Q$ CLS
4620 PRINT PRINT "YOU CHOOSE THE DIRECTION BY    PRESSING ANY KEY WHILE THE
     DIRECTION INDICATOR LINE IS     TRAVELLING AROUND THE TOWN. THE LINE WILL STOP
     AND YOUR THROW   WILL TRAVEL FROM YOUR POSITION  ABOVE THE BLANK SQUARE IN THE
4630 PRINT "MIDDLE OF THE TOWN TOWARDS THE  END OF THE LINE."
4640 PRINT INPUT"PRESS 'ENTER'";Q$ CLS
4650 PRINT PRINT "TO CHOOSE THE STRENGTH OF YOUR  THROW YOU MUST WAIT UNTIL THE
     STRENGTH INDICATOR LINE TRAVELS ACROSS THE TOP OF THESCREEN,THENSTOP IT BY PRE
     SSING ANY KEY.    THE LONGER YOU LET IT GO THE    HARDER THE THROW."
4660 PRINT PRINT "AS THE PRESENT FALLS TOWARDS THECHIMNEYS ITS HEIGHT IS INDICAT
     EDBY A LINE ON THE RIGHT OF THE   SCREEN."
4670 PRINT INPUT "PRESS 'ENTER'";Q$ CLS
4672 PRINT PRINT "TO GET A PRESENT DOWN A CHIMNEY IT MUST ENTER FROM THE TOP."
4674 PRINT PRINT "ONCE A PRESENT HAS BEEN         DELIVERED TO A PARTICULAR
     CHIMNEY IT CHANGES COLOUR SO    THAT YOU DON'T WASTE ANOTHER    PRESENT ON IT
4676 PRINT INPUT "PRESS 'ENTER'";Q$ CLS
4680 PRINT PRINT "ONE FINAL PROBLEM--AS MENTIONED,REINDEER ARE GETTING TIRED  TH
IS MEANS YOU ARE LOSING HEIGHT SO  BETTER TRY AND HIT THE FURTHEST CHIMNEYS FIRST
--LATER ON YOU MAYNOT BE ABLE TO!
4690 PRINT PRINT "AT THE END OF YOUR 40 PARCELS   YOU WILL RECEIVE A SCORE
  REFLECTING YOUR SUCCESS IN REACHING THE LOWEST CHIMNEYS.
4700 PRINT INPUT "PRESS 'ENTER' TO START";Q$ CLS RETURN
```



Ian McNaught Davis (left), Presenter, and (right), David Allen, Producer, of BBC television's forthcoming computer programme

Getting down to Basics

***David Kelly** talks to **David Allen**, producer of BBC tv's second computer programme series.*

The question of whether or not the BBC should ever have become involved in the manufacture and marketing of a microcomputer is still subject to debate

Detractors are keen to point out that not only did the failure of Acorn to satisfy delivery schedules do the BBC's reputation harm, but the offending machine had virtually no part to play in the television series *The Computer Programme*

A year later the tables have been turned — the Acorn machines are readily available and a second series on micros called *Making the Most of Your Micro* focusing on programming and applications is due to be broadcast from next January

"The first series was designed for people with no experience of microcomputing," says David Allen But somewhere along the line, people got the idea that we were doing a series dealing with programming a micro, which was not at all what the first programmes were about.

"However, that is pretty much how we see the new series It will be for those already with machines and will deal directly with programming techniques But without the first series, this new one would not have been possible

The 10 new programmes will concentrate on what can be achieved with a computer — the emphasis being firmly on the practicalities involved "Each programme will take a theme and concentrate on what you can do with your machine — hence the series title — *Making the Most of Your Micro*

"Obviously people have different machines We shall have Pets, ZX81s and so on but for the studio demonstrations of programming techniques we shall use the BBC micro

"As far as possible we shall try to deal with common ground on the different machines But there comes a point when we have had to say 'The actual detailed code will be different from this on other machines, though the principles are the same So yes — it is difficult to please everyone and yes it is a compromise — but there is no way round that

What we hope to do is to send out the programs we develop both in cassette form and over the air using Ceefax When we do this we will develop versions for most machines

January will see the launch of a new telesoftware service to coincide with screening of the television programmes

Each programme in the new series will have a main theme around which the various items in the 30-minute show will centre The series will be presented by Ian McNaught Davis with contributions in each episode from a selection of experts The plans for the series break down as follows.

Part 1 The Versatile Machine This first one acts as a shop window for the rest of the series It gives a brief idea of just what is possible with low-cost microcomputers It begins with a remarkable item on Richard Gomm, severely disabled with cerebral palsy, who finds a microcomputer invaluable in his studies for a PhD in philosophy Then John Coll of Acorn briefly tours the components that go to make up a micro and Ian McNaught Davis steps inside a computer to walk around the main hardware accoutrements on the printed-circuit board

Part 2 Getting Down to Basics Whatever dialect of Basic your machine uses, there are still only three central programming structures — sequential, branch and loop The concept of numerical variables is also introduced

Part 3 String handling Introduces procedures and sub-routines Looks at an example of good and bad programming technique

Part 4 Graphics This programme attempts to describe simple graphics programming techniques, introduces the idea of machine-code and shows how to address individual pixels in an 8 x 8 one-character area Different levels of resolution are considered, as are the commands *Move*, *Draw* and *Plot* An animation cell is shown which is developed to explore in-betweening and other more advanced animation techniques and takes a brief look at commercial computer-aided graphics like those seen in the film *Tron*

Part 5 Databases This part looks at simple file handling — data processing searching and sorting Shows how to construct a simple database

Part 6 Business Applications Considers the ways in which low-cost home micros can be used in a small business Shows a typical spread-sheet financial modelling program Briefly considers word-processing programs and illustrates some of the main pitfalls of writing your own software

Part 7 Getting Away From Basic Looks particularly at the idea of artificial intelligence

Part 8 Control Using a micro to control external apparatus A BBC Buggy will be displayed (which will be available to buy) and operated from the BBC micro It is 'intelligent' in that it senses its environment and builds up a picture of where it has been It will be able to draw lines and will incorporate a bar-code reader and light sensor

Part 9 Computer-aided Design and Music Considers further methods of non-keyboard input to the computer and also non-screen output. Sound and joystick control Shows how to draw and manipulate a three-dimensional line drawing on the screen Shows hidden-line removal rotation and shading

Part 10 Communications Deals with telesoftware Explains the BBC's Ceefax system Much of the software developed in the series will be made available for a range of machines using this system

The BBC microcomputer comes into its own in the new series "Having a dynamic relationship with one company — Acorn — has been invaluable" says David Allen "With them we have been able to develop software for the programmes and produce the vital special board which enables us to put up the computer's output cleanly on the screen

"In fact, even the sub-titles which appear on screen — as in the first programme — are generated from the machine"

Making the Most of Your Micro will be broadcast in 10 programmes beginning on January 10 Each episode will be shown three times as follows Mondays BBC2 3 05 pm Mondays BBC1 11 25 pm, and Sundays BBC 1 12 35 pm ■

Inside the black box

***Stephen Adams** looks at Qsave and the LMX programmer for the ZX81.*

Qsave is a hard and software package designed to speed up the *Loading* and *Saving* of tapes with the ZX81. It can save 16K in 30 seconds giving a speed in excess of 4000 bits per second as against Sinclair's tape speed of 250-300 bits per second.

The hardware is contained in a small black box with four 3.5mm sockets, two per side. This is a filter which fits into the ear lead between the tape recorder and the ZX81. A lead from the power pack also plugs into the unit to power the amplifier inside. The ear and power leads are provided with the unit.

The filter can also be used on its own to solve some tape *Loading* problems. It contains a high and low filter to cut out noise generated by the tape recorder head and the rumble from the mains/tape recorder motor. It also increases the level which is put out to the ZX81, so some adjustment of the tape recorder volume control may be necessary when using the unit.

One snag with the present model is that it must be disconnected when *Saving* a program, ie the lead from the ear socket of the tape recorder must be unplugged. Apart from this, the unit worked very well and considerably improved the *Loading* of Basic tapes.

Software side

The software side of the package comes in the form of a tape which auto runs when *Loaded* to put three machine code routines into the top of memory. The tape I received had only been set up for using a 16K Ram pack, but there are tapes available for 64K and other memory sizes. The machine code is not large (300 odd bytes) and is protected against a Basic program accidentally overwriting it. Only *New*, or pulling out the power plug, will erase it. The three routines, *Load*, *Save* and *Verify*, are called by *Print Usr X*, where *X* is the number of the routine.

The *Qsave* routine is *Loaded* first and then the program required. If this program has been *Qsaved* previously, then it will load in 30 seconds by calling the appropriate routine. If not, it may be loaded by the normal *Load* command and, provided it can be stopped, it can then be *Qsaved*. If, however, it jumps straight into a machine code routine, you will not be able to *Qsave* it. *Qsave* commands can be written into programs, but it is essential that the program is in *Fast* mode before using *Qsave*.

After *Saving*, the *Verify* command can be used to check that the program on tape is the same as in memory. If it is not, there is no break facility to get back to the main program, so you would have to run it through another *Qsaved* program to get back control.

The advantages of using this system are fairly obvious, but here are a few examples. A data base program using a full 16K takes approximately 11 minutes to load — using *Qsave* it takes 30 seconds. But a 16K games program also take 30 seconds to load. At present, *Qsave* takes 30 seconds whatever the length of the program.

It also does not use a program name, so it will *Load* the first *Qsaved* program it comes across. However *Qsave* manufacturer PSS says all these problems have been considered and by the time you read this the new software will have eliminated the problems.

I have tried the system with a standard tape recorder and it works very well if good tapes are used (PSS recommend the AD or D series from TDK). The volume control had to be adjusted to near enough the bottom level, well below the level I use for the ZX Spectrum or BBC micro. The *Verify* is essential, as is a tape counter to keep track of where the programs are. *Qsave* leaves the screen blank with flashing white lines across the screen, however, it is not possible to tell whether a program will *Load* or not by looking at the lines.

Qsave can save 16K in 30 seconds

PSS does sell a version which has a switch on it to eliminate the disconnection of the *Qsave* box when recording. This I feel is an essential requirement.

The documentation that comes with the system is in the form of a four-page booklet containing simple instructions and diagrams and an emergency telephone number.

I think *Qsave* will promote a greater use of the ZX81, as it allows you to have near enough the speed of discs on an ordinary tape recorder. The only thing that is missing is the ability to store just the variables or code on to tape using *Qsave*.

Qsave is manufactured by Personal Software Services, 112 Oliver Street, Coventry CV6 5FE (Tel: 0203 667556) and costs £15.95 for 16K and £17.95 for 64K.

LMX programmer

The LMX PROM programmer was designed to work on the minimum 1K ZX81 and so has a few limitations. One of these is that it can only cope with one type of Eprom (a Rom that can be reprogrammed), the 2716. However, this is available from various manufacturers and it can hold up to 2K of machine code.

The board is easy to build if you have a little soldering experience. The instructions are easy to follow and the technical details are fully explained. If, however, you want to use it with a 16K Ram pack, extra wire must be provided to connect up the pcb edge on the far side of the programmer. Also, the program to control the programmer, which is supplied on tape, is written in machine code for 1K and produces a peculiar display with the 16K pack.

The programmer is roughly decoded so that it occupies the whole of the 8K-16K space on the memory map and also appears on the 40K-48K section. This means it is not suitable for use with Ram packs of 32K or above. The Eprom is programmed by writing to the memory location required in the Eprom with a 30-36 volt battery applied to the board. This battery can be made of four PP3s, as shown in the notes.

In the program supplied you can change the address to anywhere in a 2K range and alter the memory location. All addresses and data are in hex, so conversions must be done with the aid of the ZX81 manual if you are working in decimal. The instructions to increment/decrement and burn are all single key from the keyboard, using the overlay provided. An led on the board lights normally and goes out when burning data into a location. The program has an error check to stop you programming a location that has already been done.

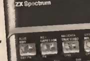
With a 1K ZX81 this is a very cheap way to program Eproms to store machine code programs (Basic cannot be stored in it), but if you have expanded your machine in any way it is a bit limiting. The programming could have been done just as easily with Basic using *Poke* to program the Rom and *Peek* to check it. Then a large array of data could have been dumped into the Eprom by the ZX81, rather than having to enter it all from the keyboard.

The LMX Prom programmer is available from Lander Microsystems, 32 Clockhouse Lane, Colliers Row, Romford, Essex RM5 3QJ (Tel: 0708 26325) for £17.50 as a kit, excluding batteries and Eprom.

Sinclair ZX Spectru

16K or 48K RAM... full-size moving-key keyboard... colour and sound... high-resolution graphics...

From only £125!



First, there was the world-beating Sinclair ZX80. The first personal computer for under £100.

Then, the ZX81. With up to 16K RAM available, and the ZX Printer. Giving more power and more flexibility. Together they've sold over 500 000 so far, to make Sinclair world leaders in personal computing. And the ZX81 remains the ideal low-cost introduction to computing.

Now there's the ZX Spectrum! With up to 48K of RAM. A full-size moving-key keyboard. Vivid colour and sound. High-resolution graphics. And a low price that's unrivalled.

Professional power – personal computer price!

The ZX Spectrum incorporates all the proven features of the ZX81. But its new 16K BASIC ROM dramatically increases your computing power.

You have access to a range of 8 colours for foreground, background and border, together with a sound generator and high-resolution graphics.

You have the facility to support separate data files.

You have a choice of storage capacities (governed by the amount of RAM). 16K of RAM (which you can uprate later to 48K of RAM) or a massive 48K of RAM.

Yet the price of the Spectrum 16K is an amazing £125! Even the popular 48K version costs only £175!

You may decide to begin with the 16K version. If so, you can still return it later for an upgrade. The cost? Around £60.

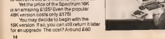
Ready to use today, easy to expand tomorrow

Your ZX Spectrum comes with a mains adaptor and all the necessary leads to connect to most cassette recorders and TVs (colour or black and white).

Employing Sinclair BASIC (now used in over 500 000 computers worldwide) the ZX Spectrum comes complete with two manuals which together represent a detailed course in BASIC programming. Whether you're a beginner or a competent programmer, you'll find them both of immense help. Depending on your computer experience, you'll quickly be moving into the colourful world of ZX Spectrum professional-level computing.

There's no need to stop there. The ZX Printer – available now – is fully compatible with the ZX Spectrum. And later this year there will be Microdrives for massive amounts of extra on-line storage, plus an RS232/network interface board.





Key features of the Sinclair ZX Spectrum

- Full colour – 8 colours each for foreground, background and border, plus flashing and brightness-intensity control
- Sound – BEEP command with variable pitch and duration
- Massive RAM – 16K or 48K
- Full-size moving-key keyboard – all keys at normal typewriter pitch, with repeat facility on each key
- High-resolution – 256 dots horizontally x 192 vertically, each individually addressable for true high-resolution graphics
- ASCII character set – with upper- and lower-case characters
- Teletext-compatible – user software can generate 40 characters per line or other settings
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- Sinclair 16K extended BASIC – incorporating unique 'one-touch' keyword entry, syntax check, and report codes

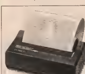
rum

The ZX Printer – available now

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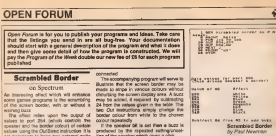
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Scrambled Border

on Spectrum

An interesting effect which will enhance some games programs is the scrambling of the screen border, with or without a warning buzz.

The effect relies upon the output of values to port 254 (which controls the speaker and the border colour) of certain values using the *Out* Basic instruction. It is not necessary to have any external ports connected.

The accompanying program will serve to illustrate that the screen border may be made to stripe in various colours without disturbing the screen display area. A buzz may be added, if required by subtracting 24 from the values given in the table. The two *Out* instructions simply change the border colour from white to the chosen colour repeatedly.

If the speaker bit is set then a buzz is produced by the repeated setting/unsetting of the speaker which gives a click.

```
   1 REM Scrambled border by P N
ewman.
   5 PRINT "hello"
   9 FOR J=1 TO 100
  10 OUT 254,255
  15 OUT 254,NS
  20 NEXT J
  30 PRINT "ok"
  40 STOP
```

```
Data values for port 254
(This drives speaker & border)

Value of NS       Effect

255               White
254               Yellow
253               Cyan
252               Green
251               Magenta
250               Red
249               Blue
248               Black

Subtract 24 from NS to add buzz
```

Scrambled Border
by Paul Newman

Poster

on BBC Micro

This simple routine utilises the BBC's *Point* (X Y) statement to reproduce characters displayed on the screen, greatly enlarged, on a print-out.

The *Rem* statements explain the restrictions on the size of the poster characters and on the length and depth of the whole poster. The X and Y loops take the *Point* (X Y) statement from the bottom of the first screen line to the top of the screen and from the left of the screen to the right.

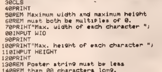
Lines 240 and 250 serve to find what character is printed and use that character form to print the enlarged version of that character on the print-out. Unfortunately the printing character is at right angles to the poster character. If this is unacceptable X can be printed instead by replacing line 290 with

290 LET B = ASC("X")

The W loop sets the maximum character width and the H loop the maximum character height. The alterations for *Mode* 4 operation are to take account of the fact that the *Mode* 4 screen width is half that of the *Mode* 0 screen width.

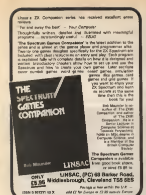
The routine will print the whole of the contents of the first line regardless of how large the poster string is. To save time once the poster string has been printed *Escape* can be pressed to terminate the program.

The program does not use graphics characters so any printer should be suitable. To convert the program for use on other computers with a *Point* (X Y) statement the lines using the screen dimensions (Lines 230, 240 and 270) may have to be altered and the equivalent of the *Vdu* statements used. Note that *Vdu* 1,10 sends a line feed to the printer only.



```
10REM POSTER
20REM **A PROGRAM TO PRINT BIG CHARACTERS**
30CLS
40PRINT
50REM Maximum width and maximum height
60REM must both be multiples of 8.
70PRINT"Max. width of each character ";
80INPUT WID
90PRINT
100PRINT"Max. height of each character ";
110INPUT HEIGHT
120PRINT
130REM Poster string must be less
140REM than 80 characters long.
150PRINT"Poster string ";
160INPUT A$
170CLS
180MODE 0
190PRINTA$
200VDU 2    :REM Printer on.
210W1=WID/8
220H1=HEIGHT/8
230FOR X=0 TO 1279 STEP 2
240LET A=(X DIV 16)+1
250LET B$=MID$(A$,A,1)
260FOR W=1 TO W1
270FOR Y=991 TO 1023 STEP 4
280LET PO=POINT(X,Y)
290LET B=ASC(B$)
300LET C=ASC(" ")
310FOR N=1 TO H1
320IF PO=0 THEN 350
330VDU 1,B
340GOTO 360
350VDU 1,C
360NEXT N
370NEXT Y
380VDU 1,10
390NEXT W
400NEXT X
410VDU 3              :REM Printer off.
420END
430REM Changes for MODE4 operation.
440REM 130REM Poster string must be less
450REM 140REM than 40 characters long.
460REM 180MODE 4
470REM 230FOR X=0 TO 1279 STEP 4
480REM 240LET A=(X DIV 32)+1
```

Poster
by Clive Stokes





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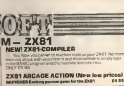
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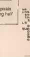
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Spirals

on ZX81

Here are two programs for drawing spirals The circular routine is done by drawing half circles one at a time



```
   5 INPUT "Enter the scale of t
he spiral ",y: INPUT "Enter the
ink colour ",i: INPUT "Enter the
 border colour ",b: INPUT "Enter
 the paper colour ",p
  10 INK i: BORDER b: PAPER p: C
LS : LET x=0: PLOT 126,85
  20 DRAW x,x,PI: LET x=x+y: GO
SUB 37: DRAW -x,-x,PI: LET x=x+y
 GO SUB 37: GO TO 40
  37 IF x>=100 THEN GO TO 5
  38 RETURN
  40 GO TO 20
```

Spirals
© Andrew Astrand
Ryed 18

```
   5 INPUT "Enter the scale of t
he spiral ",y: INPUT "Enter the
ink colour ",i: INPUT "Enter the
 border colour ",b: INPUT "Enter
 the paper colour ",p
  30 PLOT 0,0: LET x=170: BORDER
 b: PAPER p: INK i: CLS
  30 DRAW x+85,0: LET x=x-y: GO
SUB 40: DRAW 0,x: LET x=x-y: GO
SUB 40: DRAW -x-85,0: LET x=x-y:
 GO SUB 40: DRAW 0,-x: LET x=x-y
  GO SUB 40: GO TO 30
  40 IF x<=0 THEN GO TO 5
  50 RETURN
  60 GO TO 30
```



Spirals 2
© Andrew Astrand

Spirals
by Andrew Astrand

Morse code tutor

on ZX81

Several morse tutor programs for the ZX81 have been published but they all suffer the same disadvantage namely — that the morse is not taught as it should be — by *sound* It is absolutely no use whatever learning that 'dot dot dot' is 'S', it takes too long to interpret. Morse reading must be instinctive and this can only be achieved to any degree by learning the sound pattern

This program, designed for the ZX81 1K, generates morse code at a preset speed ranging from around five words per minute (very slow) to about 25 words per minute (about twice the Radio amateurs exam standard) Chosen groups of characters may be learned by simple changes to the program

Construction of the program

First enter a line 1 REM followed by 38 dots and *Poke* the contents of the table into this storage area The last three bytes of the table are a simple machine code program to make the 'buzz' Next, edit line 1 to add, in the order shown the series of letters and numbers — 36 in all The first 36 bytes entered in the Rem are a look-up table of the morse characters in coded form

They are actually the morse sequence in binary, 'dot' = 0 and 'dash' = 1 Simple division by two will yield each successive character in turn — see lines 90 and 140 The sequence in lines 110 to 120 creates a buzz for each character The construction in line 110 gives a long buzz for a dash and short for dot the ratio of 3-1 being preserved no matter what the speed chosen

Enter the rest of the program as listed, omitting all other Rems if you only have 1K The letter-table in the last 36 bytes of line 1 shows the 'natural' sequencing of morse when graded by ease of learning viz E I S H/ T M O/ A U V/ N D B/ W J C K/ P G R L/ Q Z F X Y/ and 1 2 3 4 5/ 6 7 8 9 0/ Line 40 sets this and is for the whole code as given

To alter this to say /E I S H/ place the *Code* for '4' instead of '8 i.e. generate a number between 1 and 4 Other pointers may be set in a similar manner The printer buffer is used as 'free storage space and does not affect the printer, if plugged in

Speed is set by line 5 and is variable between the practical limits of 5 and 25 wpm Morse is heard by either monitoring the 'mic' line with a small amplifier or turning up the TV sound and perhaps slightly de-tuning the video The screen display collapses while morse is being sent (it cannot be sent in *Slow*) When the display is restored, you simply enter the characters you received (use Newline as 'don't know') one at a time If you were correct the character is printed If wrong then the correct one is printed in reversed video

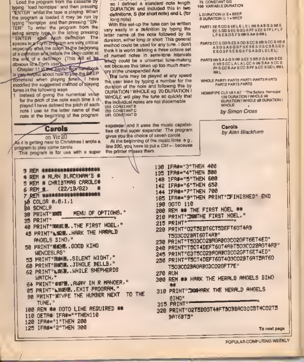
With more memory it is desirable to make the program easier to use by adding menu selection of speed and letter groups as well as better screen display of checking This is left to you!

```
   1 REM [illegible]
 ,1YUSK6578JZPEEK TO TAN EISHTMO
AUVNDBWJCKPGRLQZFXY1234567890
   3 REM LINE 5 GOVERNS SPEED.TH
IS IS SET=12 (CODE Z=18).
   5 LET S=CODE "[illegible]"
  10 LET B=CODE "[illegible]"
  15 LET C=CODE "[illegible]"
  25 LET M=VAL "16443"
  30 FOR J=0 TO CODE "="
  35 REM POKE INTO THE PRINTER B
UFFER A RANDOM BETWEEN 1 AND 36.
  40 POKE M+J,INT (RND*CODE "8")
+0
  50 REM LOOK UP THE MORSE DATA
USING POINTERS STORED IN PRINTER
 BUFFER.
  70 LET L=PEEK (M+J)
  80 LET E=PEEK (16513+L)
  85 REM START BINARY DIVISION
  90 LET E3=E-INT (E/C)*C
 100 FAST
 110 FOR Z=0 TO (VAL "100"+CODE
"COS "*E3)/5
 120 LET M=USR 16550
 130 NEXT Z
 135 REM BINARY DIVISION AGAIN
 140 LET E=INT (E/C)
 145 LET H=S+CODE "[illegible]"*(E<0)
 150 FOR Z=0 TO INT ((VAL "126"*
H)/5)
 160 NEXT Z
 170 REM GO BACK FOR MORE.
 180 IF E>0 THEN GOTO VAL "80"
 190 NEXT J
 200 SLOW
 205 REM CHECK ANSWERS.INPUT ONL
Y 1 CHARACTER AT A TIME.
 210 FOR J=0 TO CODE "="
 215 INPUT Z$
 220 LET A$=CHR$ PEEK (PEEK (M+J
)+16552)
 225 REM PRINT CHECK IN REVERSED
 VIDEO IF WRONG.
 230 PRINT CHR$ (CODE A$+128*(A$
<>Z$));
 240 NEXT J
```

LINE 1 REM VALUES

16514	2	16515	4
16516	6	16517	16
16518	3	16519	7
16520	16	16521	6
16522	12	16523	24
16524	6	16525	9
16526	17	16527	14
16528	30	16529	21
16530	13	16531	22
16532	11	16533	10
16534	16	16535	27
16536	19	16537	26
16538	26	16539	29
16540	62	16541	66
16542	56	16543	48
16544	32	16545	33
16546	36	16547	39
16548	47	16549	63
16550	211	16551	223
16552	201		

Morse Code Tutor
by Paul Newman



Sailors' Hornpipe

on Jupiter Ace

This is a Forth program written to run on the unexpanded Jupiter Ace The program plays "The Sailors Hornpipe" three times with increasing speed on each repetiodn

Load the program from the cassette by typing "load hornpipe" and then pressing "ENTER" whilst the tape is playing When the program is loaded it may be run by typing "hornpipe" and then pressing "ENTER" To enter the program from the listing simply type in the listing pressing "ENTER" after each definition The spaces in a Forth program are very critical especially after the colon at the beginning of a definition and before the semi-colon at the end of a definition (This will all be obvious to a Forth user)

Chapter 11 in the Jupiter Ace handbook is very helpful about how to use the BEEP command when playing tunes I have modified the suggested method of playing tunes in the following ways

1 Instead of giving the numerical value for the pitch of the note each time it is played I have defined the pitch of each note I use as the letter name of that note at the beginning of the program The tune is in E major so C, D, G and F should all be sharps, however, I omitted the sharp signs to make the typing simpler The note A does become A sharp a couple of times so I had to define an A# note
2. There are only two lengths of notes in the tune (semi-quavers and quavers) so I defined a standard note length DURATION and included this in two definitions, S (for short note) and L (for long note)

With this set-up the tune can be written very easily in a definition by typing the letter name of the note followed by its duration, either long or short This general method could be used for any tune I don't think it is worth defining a three octave set of named notes in semi-tone intervals which could be a universal tune-making set because this takes up too much memory in the unexpanded Ace

The tune may be played at any speed the user likes by typing a number for the duration of the note and following this by DURATION ! WHOLE eg 20 DURATION ! WHOLE will play the tune so quickly that the individual notes are not discernable

```
253 CONSTANT B
225 CONSTANT C
201 CONSTANT D
199 CONSTANT E
188 CONSTANT F
166 CONSTANT G
142 CONSTANT A
134 CONSTANT A#
127 CONSTANT BB
113 CONSTANT CC
100 CONSTANT DD
 90 CONSTANT EE
 84 CONSTANT FF
 75 CONSTANT GG
100 VARIABLE DURATION

L DURATION @ 2 * BEEP
S DURATION @ 1 * BEEP

PART1 EE S DD S EE L E L E L BB S A S G S BB S
      EE S DD S EE S GG S FF S EE S FF L F L F
      L F S E S D S F S BB S A# S BB L

PART2 CC S DD S EE S DD S CC S BB S CC S BB S
      A S G S A S G S F S E S E S D S C S B S C S
      E S D S F S E S G S F S A S G L E L E L

PART3 BB S A S G S BB S EE S BB S G S BB S EE
      S BB S CC L A L A L CC S BB S A# S CC S
      FF S CC S A# S CC S FF S CC S DD L BB L
      BB L

WHOLE PART1 PART2 PART1 PART2 PART3
      PART2 PART3 PART2

HORNPIPE CLS 10 5 AT " The Sailors Hornpipe"
      120 DURATION ! WHOLE 90
      DURATION ! WHOLE 60 DURATION !
      WHOLE ;
```

by Simon Cross

Carols

on Vic 20

As it is getting near to Christmas I wrote a program to play some carols

This program is for use with a super expander and it uses the music capabilities of the super expander The program gives you the choice of seven carols

At the beginning of the music lines e g , line 220, you have to put a *Ctrl* ← because the printer misses them

Carols
by Alan Blackham

```
5 REM ********************
4 REM * ALAN BLACKHAM'S *
5 REM * CHRISTMAS CAROLS*
6 REM *    (22/10/82)   *
7 REM ********************
10 COLOR 0,0,1,1
20 SCNCLR
30 PRINT"     MENU OF OPTIONS."
35 PRINT"    ________________"
40 PRINT"1..THE FIRST NOEL,"
45 PRINT"2..HARK THE HARALD
   ANGELS SING,"
50 PRINT"3..GOOD KING
   WENCESLAS"
55 PRINT"4..SILENT NIGHT,"
60 PRINT"5..JINGLE BELLS,"
62 PRINT"6..WHILE SHEPHERDS
   WATCH,"
64 PRINT"7..AWAY IN A MANGER,"
85 PRINT"9..EXIT PROGRAM."
90 PRINT"TYPE THE NUMBER NEXT  TO THE
   TUNE."
100 REM ** GOTO LINE REQUIRED **
110 GETA$ IFA$=""THEN110
120 IFA$="1"THEN 200
125 IFA$="2"THEN 300
130 IFA$="3"THEN 400
135 IFA$="4"THEN 500
140 IFA$="5"THEN 600
142 IFA$="6"THEN 650
144 IFA$="7"THEN 700
185 IFA$="9"THEN PRINT"FINISHED" END
190 GOTO 110
200 REM ** THE FIRST NOEL **
210 PRINT"THE FIRST NOEL."
215 PRINT"_______________"
220 PRINT"O2T5EDT6CT5DEFT6GT4AB
    T5O3CO2BAT6GT4AB"
230 PRINT"T5O3CO2BAGABO3CO2GFT6ET4ED"
240 PRINT"T5CT4DEFT6GT4ABT5O3CO2GAGT4AB"
245 PRINT"O3T5CO2BAGABO3CO2GFT6ET4ED"
250 PRINT"T5CT4DEFT6GT4O3CO2BT6AT5AT6G
    T5O3CO2BAGABO3CO2GFT7E"
270 RUN
300 REM ** HARK THE HERALD ANGELS SING
    **
310 PRINT"HARK THE HERALD ANGELS
    SING"
315 PRINT"__________________________"
320 PRINT"O2T5DGGT4#FT5O3BAO3DDDT4CO2T5
    BAT6BT5"
```

To next page

```
325 PRINT"DGGT4#FT5DBBA03D02AAT4GT5#FET
    6DT5"
330 PRINT"03BGD02T4GT503C02BBA03DDD02
    T4GT503C02BBA"
332 FORI=1TO2
335 PRINT"03EEET4DT5C02BT603C02T5AT4
    B03CT5D02GGAT6BT5"
340 PRINT"03EEET4DT5C02BT603C02T5AT4
    B03CT5DD20GAT7G"
350 RUN
400 REM ## GOOD KING WENCESLAS ##
410 PRINT"Ɔ GOOD KING WENCESLAS"
415 PRINT" ________________________"
420 PRINT"02T50GGAGGT6DT5EDE#FT6GGT5"
430 PRINT"0GGAGGT6DT5EDE#FT6GGT5"
435 PRINT"03DC02BABAT6GT5EDE#FT6DGT5"
440 PRINT"DDE#FGGT6AT503DC02BAT7G03
    C02TGD"
450 RUN
500 REM ## SILENT NIGHT ##
510 PRINT"Ɔ      SILENT NIGHT."
515 PRINT"       _______________"
520 PRINT"02T6GT5AT6GT7ET6GT5AT6GT7E03D
    T6DT702B03CT6CT702GAT6A03"
530 PRINT"C02T5BT6A0TT5AT6GT7EAT6A03C02
   T5BT6AGT5AT6GT7ED3DT6DFT5DD2T6B03T7C"
540 PRINT"ET6C02GEGT5FT6DT8C"
550 RUN
600 REM ## JINGLE BELLS **
610 PRINT"Ɔ      JINGLE BELLS."
615 PRINT"       _______________"
620 PRINT"02T5BBT6BT5BBT6BT5B03D02GT4AT
    6B03T5CCCT4C"
625 PRINT"T4C02BT5BT4BAABT5AT4B
    BT5BT4BBT5BT4B03D02GT3AT5"
630 PRINT"B03T4CCCT3CT4C02BBT3BT403BDC0
    2AT5GT4A"
635 PRINT"BBAGT5DT4DBAGT5ET4E03C02BA"
640 PRINT"03DDDT3DT4EDD2A4AT5BT4DBAGT5D
    T4DBAGT5ET4E03C02BA03DDDT3D
    T4EDC02AT5GT4"
645 PRINT"02T4BBT5BT4BBT5BT4B03D02GT3A
    T5B03T4CCCT3C"
647 PRINT"T403C02BBT3BT403DDC02AT6G"
649 RUN
650 REM ## WHILE SHEPHERDS WATCH ##
655 PRINT"Ɔ WHILE SHEPHERDS WATCN",
660 PRINT" __________________________"
670 PRINT"02T5GBT4BT5AGG3CCD
    2BAB03DD#C02T603D02T5B"
675 PRINT"03ET4BT5C02BAG#FBAGG#FT7G"
680 RUN
700 REM ## AWAY IN A MANGER ##
710 PRINT"Ɔ   AWAY IN A MANGER"
715 PRINT"    ____________________"
720 PRINT"02T5CFFT4GAT5FFT4AB03T5CCD02
    T6#BT5GA#B#B03C02AAT4FAT5GDFT6ET5C"
725 PRINT"FFT5GAFFA#BT403T5CCD02T6#BT4
    GAT5#B#B03C02AAT4FAT6GDET7F"
730 RUN

READY.
```

Blockshift

on BBC Micro

Functions, procedures and calls on a micro are extremely useful. They allow you to expand the instruction set of your computer without the complication of redirecting the error handling routines or other such nasties

A good example of the use of calls is on the RML 380Z for when the high res graphics board is installed, the standard Basic has no instructions to cope with line drawing or plotting so instead of redesigning a major part of the interpreter machine code routines are added When the Basic is loaded in, so are the routines To use these you must then access them through the Basic command CALL e.g., BBC Basic's MOVE X,Y becomes CALL "PLOT",X,Y,Z

Because the Basic is in Ram, it is possible to alter the instruction set, or to add more commands and then save the modified version for a later date Most home computers have their languages in Rom so although it is very difficult to alter the standard instruction set you can easily add your own routines and load them in off tape/disk into a spare be of memory

What follows is for the BBC micro, but the general ideas might be of some interest to users of other computers

BBC Basic is extremely fast and is adequate for most purposes There is one area where I continually find a need for a fast simple alternative and that is when dealing with the graphics Any Basic is going to be pushed to shift around 20K of memory in under a second

If you look in your back copies of PCW, Vol 1 No 16 page 15, you will find a routine to scroll the screen We will use that and the program in this article to demonstrate how to add more commands via CALL and PROC

To execute the scrolls, the only thing needed is to say 'CALL RSCROLL and the whole screen shifts sideways however the 'BLOCK' program copies a specified section of the screen to another specified position Therefore, we need a way of passing these parameters to the machine code It is possible to use CALL but with the parameters included after the name, however this would involve a lot of nasty calculating (working out the start addresses and the number of times the loop must be executed) and since this only has to be done once it is much easier for Basic to deal with the maths and let the m/c deal with the donkey work of shifting the memory about

To use the 'BLOCK' you must use PROC_BLOCK (bottom left X Y, top right X Y final top left X Y) This sets up the hex locations 70,71 with the start address of the portion of screen to be copied 72 73 with the start of the destination 76 77 with the number of bytes in one horizontal line of the specified block of screen The X register is also set to the number of lines to be copied

When this is done, the procedure calls the m/c which uses the values previously calculated to shift the required memory

The way to save the m/c of both programs is as follows First, type in lines 290 to 430 of 'BLOCK then add on to the end

Turn to page 24

of that the lines of any other routines you have (e g 50-250 of Scroll) Remember that the last thing must be the instructions in line 440 You must now find out how long the code is One way of doing this is to add a label FINISH after the last m/c instruction

The length is now found simply by subtracting the first label from FINISH A good place to put the code is just before the graphics memory To find out where the code starts use (&2FFF–(length of code)) Set P% to this instead of DIM P% and call setup again Now save the section of memory required using *SAVE "ROUTINES (start of code in hex) 2FFF

Lastly make a note of the addresses stored in the variables used to call the routines (in the 'block shift only the variable BLOCK would be needed)

Now you can write your graphics program which use the routines, remembering of course that you must *LOAD ROUTINES before running the program and that the first lines should set the variables such as BLOCK and RSCROLL with the start addresses of the routines

BLOCK SHIFT works in modes 0,1 2 and regards the screen as a 80 × 32 grid (mode 0 text) The first four parameters define the rectangle to be copied the last two the position where the copy will be placed As it stands the program works well

If you intend to use it I would advise you to provide some data validation at line 195 since if by some mistake the bottom left Y coordinate is made less than the top right Y, it is possible that the m/c will make mincemeat of the program which you spent hours perfecting and forgot to save before running

In line 340 there are two 'no operation codes Normally when the code is executed the block of screen is copied exactly However, if the Basic program places some new instructions instead of the NOP s different effects can be produced

If EOR #255 was used everything copied would be inverted (lines 30 and 70 do this) If you do not require this delete lines 320 and 330 If the Basic program is quite long, it would be better to say *SAVE"PROG' E00 2FFF, LOAD "PROG

This would then load in the m/c as well as the Basic, but be careful that your program is not too long or it will overwrite the m/c

```
5 REM**BLOCK SHIFT*GLJ OCT82**
10 PROC_SETUP
20 MODE0
25 REM****MODE0 DEMO****
29 REM**change NOP NOP to EOR #0 **
30 ?FUNCTION=&49 FUNCTION?1=0
40 FOR L%=0TO359STEP2 A=RAD(L%) B=60*SIN(A*2)
50 PLOT69,B*SIN(A)+50,B*COS(A)+60 NEXT
60 FOR V%=0TO31STEP4 FOR W%=0TO75STEP6
70 FUNCTION?1=FUNCTION?1 EOR 255
80 PROC_BLOCK(0,31,5 28,W%,V%) NEXT NEXT
90 TIME=0 REPEAT UNTIL TIME>200 MODE2
95 REM****MODE2 DEMO****
100 FOR L=1TO100 GCOL0,RND(7) DRAW RND(1280),RND(512) NEXT
110 PROC_BLOCK(0,31,79,16,0,0)
120 TIME=0 REPEAT UNTIL TIME>20B MODE1
125 REM****MODE1 DEMO****
129 REM**change NOP NOP to ORA(&72),Y **
130 ?FUNCTION=&11 FUNCTION?1=&72
140 VDU19,1,2,B,0,0 FOR W%=1TO3 GCOL0,W% FOR L%-1TO100STEP2
150 V%=(SQR(10001-L%*L%))-W%*15 PLOT69,L%/3,V% PLOT69,70-L%/3,V%
160 NEXT NEXT FOR L%=1TO150
170 V%=RND(75) W%=RND(20) IF V%<5 AND W%>24 GOTO 170
180 PROC_BLOCK(0,31,4,29,V%,W%) NEXT END
182
185 ****************************************************
190 DEF PROC_BLOCK(BX,BY,TX,TY,FX,FY)
200 TLCO=&3000+640*TY+8*BX
210 FTCO=&3000+640*FY+8*FX
220 ?&70=TLCO AND &FF ?&71=(TLCO AND &FF00)/255
230 ?&72=FTCO AND &FF ?&73=(FTCO AND &FF00)/255
240 DIFF=(TX-BX)*8+8 ADD=640-DIFF
250 ?&76=DIFF AND &FF ?&77=(DIFF AND &FF00)/255
260 ?&88=ADD AND &FF ?&89=(ADD AND &FF00)/255
270 X%=BY-TY+1 CALL BLOCK ENDPROC
275 ****************************************************
290 DEF PROC_SETUP FOR O=0TO1 DIM P%500 [OPT O*3
300 .BLOCK LDA #0 STA &7B STA &79 LDY #0
310 .LOOP LDA(&70),Y
320 .FUNCTION
330 NOP NOP
```

To next page

from previous page

```
340 STA(&72),Y
350 CLC:LDA#1 ADC &70 STA &70 LDA #0 ADC &71:STA &71
360 CLC LDA#1 ADC &72 STA &72 LDA #0:ADC &73:STA &73
370 CLC:LDA#1 ADC &78:STA &78:LDA #0 ADC &79:STA &79
380 CMP &77 BNE LOOP
390 LDA &78:CMP &76:BNE LOOP
400 CLC:LDA &88 ADC &70 STA &70 LDA &89 ADC &71 STA &71
410 CLC LDA &88:ADC &72 STA &72:LDA &89:ADC &73 STA &73
430 DEX BNE BLOCK RTS
440 ]:NEXT:ENDPROC
```

Blocksheet
by Gareth Jones

Ghost Chase

on Spectrum

The user-definable characters, for Ghost Chase are set up from line 600 To save readers aching fingers I have used decimal numbers in the *Data* statements rather than *Bin* numbers, which are than poked into the characters To help with the speed of the game I have only included *Beeps* when destruction of either your player or the ghost occurs

While writing the program I discovered an annoying problem regarding the function *Screen$* (x,y), which gives the character at row x and column y of the screen The problem is that if the character has a code greater than 127, *Screen$* (x,y) does not work For instance, if you use *Screen$* on any character which you have defined it will return a null string as the answer and the code of *Screen$* (x,y) will be 0 The character in lines 120 and 130 is a normal capital X and not a graphics character

Other than this the program is based on a fairly simple idea In fact the actual routine which appears to make the ghost chase you is at lines 70 and 80 Line 70 adjusts the row in which the ghost is until it is the same as your player and line 80 does the same for the column

```
  1 GO SUB 800
  2 GO SUB 800
  3 LET q=0: LET s=0: LET p=5: LET hs=0
  5 BORDER 0: PAPER 0: INK 7: CLS
 10 LET a=INT (RND*18)+2
 15 PLOT 40,0: DRAW 215,0: DRAW 0,168: DRAW -215,0: DRAW 0,-168
 20 LET b=INT (RND*12)+10
 30 LET x=2*(INT (RND*8)+2)
 40 LET y=2*(INT (RND*10))+10
 45 LET e=2*(INT (RND*5))+8: LET f=2*(INT (RND*8))+10
 46 IF e=x OR e=a OR f=y OR f=b THEN GO TO 45
 47 PRINT AT e,f; PAPER 2; "X"
 48 IF q=p THEN GO TO 50
 49 LET q=p: FOR z=0 TO 7-p: GO TO 45: NEXT z
 50 PRINT AT x,y; INK 5;"A": LET v=x: LET w=y
 60 PRINT AT a,b; INK 6;"B": LET c=a: LET d=b
 70 LET a=a-(x<a)+(x>a)
 80 LET b=b-(y<b)+(y>b)
 90 LET x=x+2*(INKEY$="6")-2*(INKEY$="7")
 95 LET x=x+2*(x<1)-2*(x>20)
100 LET y=y+2*(INKEY$="8")-2*(INKEY$="5")
105 LET y=y+2*(y<5)-2*(y>31)
110 PRINT AT v,w;" ";AT c,d;" "
115 IF a=x AND b=y THEN GO TO 400
120 IF SCREEN$ (a,b)="X" THEN GO TO 200
130 IF SCREEN$ (x,y)="X" THEN GO TO 300
140 GO TO 50
200 PRINT AT a,b; FLASH 1;"B"
210 FOR d=2 TO 40 STEP 4
211 BEEP d/300,-15
212 NEXT d
215 PRINT AT a,b;" "
216 LET s=s+10
217 PRINT AT 10,0; PAPER 4; FLASH 1;"SCORE"
218 PRINT AT 12,0; FLASH 1; PAPER 0;s
220 GO TO 10
300 PRINT AT x,y; FLASH 1;"A"
310 FOR d=20 TO 1 STEP -1
311 BEEP d/300,25
312 NEXT d
315 PRINT AT x,y;" "
316 LET p=p-1: IF p=0 THEN GO TO 500
320 GO TO 10
400 PRINT AT x,y; FLASH 1;"B"
410 FOR d=1 TO 30
411 BEEP .01,INT (RND*60)-20
412 NEXT d
413 PRINT AT x,y;" ": PRINT AT e,f;" "
415 LET p=p-1: IF p=0 THEN GO TO 500
420 GO TO 10
500 PAPER 1: FLASH 1: CLS
510 PRINT AT 10,12;"O U T  O F";AT 12,13;"H E N"
515 FOR n=40 TO -20 STEP -1
516 BEEP .01,n
517 NEXT n
520 FOR d=1 TO 200: NEXT d
530 FLASH 0: CLS
535 PAPER 0: CLS
540 IF hs<s THEN LET hs=s
550 PRINT AT 8,10; PAPER 3;"HIGH SCORE ";hs;AT 18,0; PAPER 5; INK 0;"PRESS ANY KEY FOR ANOTHER GO"
560 LET a$=INKEY$: IF a$="" THEN GO TO 560
565 LET p=5: LET s=0
570 GO TO 5
600 FOR n=0 TO 7
610 READ d: POKE USR "a"+n,d
620 NEXT n
630 DATA 28,82,42,107,127,127,109,73
640 FOR n=0 TO 7
650 READ d: POKE USR "b"+n,d
660 NEXT n
670 DATA 145,82,0,198,0,74,137,0
680 FOR n=0 TO 7
690 READ d: POKE USR "c"+n,d
700 NEXT n
710 DATA 8,28,8,62,8,8,20,34
720 RETURN
800 BORDER 0: PAPER 0: INK 7: CLS
805 PRINT TAB 8; INK 6; FLASH 1;" G H O S T  C H A S E "
810 PRINT ''"You have to move your man (";INK 5;"A";INK 7;") around the screen to entice the ghost (";INK 6;"B";INK 7;"), which is chasing you, to run into the bombs! (";PAPER 2;"X";PAPER 0;"). But be careful you don't run into the bomb or let the ghost catch you. You have 5 lives. Good luck.";''
820 PRINT ''"Press keys ""5"" - ""8"" to move in direction shown on key"
830 PRINT ' FLASH 1;"Press any key to continue"
840 LET a$=INKEY$: IF INKEY$="" THEN GO TO 840
850 RETURN
```

Ghost Chase
by Jeremy Hall

Heart of the matter

***Asghar Ahmed** rolls the bones in an educational game for the unexpanded Vic20*

This program runs on an unexpanded Vic20 and tests your skills on naming various bones in Latin. It starts by drawing a skeleton with arrows pointing to various bones which you have to name. The score is shown throughout the program. There are five questions which show the graphic make-up of a skeleton.

The next section of the program is named "Bone Test". In this part the computer will give you three questions about bones. When the three questions are up it plays a tune and displays your final score. This program takes full advantage of the Vic's sound and graphics capabilities.

Program notes

Lines
2 clears the screen and sets the score variable at nought.
4 to 25 graphics for the skeleton
100 reads a screen location from the data.
110 pokes screen location and colour
120 waits for you to input an answer
130 reads the answer from the data.
140 sees if the input is same as the data.
150 displays score
160 blanks out the arrow then goes to 7 which clears the screen again, but this time printing the arrow at a different bone
703 clears the screen
704 set I at 6
705 to 707 prints the head line
708 reads a question from the data.
709 reads the answer from the data.
710 prints the question
720 waits for you to input the answer
730 sees if the input is the same as the data.
740 displays the score
750 goes to 7 which clears the screen and prints the headline again and issues the next question
800 to 809 are music
810 to 820 wait for you to press *Y* or *N*.
830 if *Y* is pressed then run.
840 if not print chicken
2000 onwards are data for colour, arrows, questions answers and music

Eliminating long delays

***A Collyer** explains how to save and load programs with non-standard Basic.*

If you own a Vic20 with more than 8K of memory, you probably know you can only have a user definable character set if you move the start of Basic. The problem comes once the program is *Saved* because you need to remember to move Basic before *Loading*.

The following method solves this and allows the character set to be *Saved* along with the program, eliminating those long delays at the start of a program while new characters are defined.

First, starting with a fresh system, enter the basic line

10 POKE 44 30 RUN

then type

POKE 45 3 POKE 46,30 POKE 7680 0
POKE 43,1 POKE 44 30 NEW (return)

This moves Basic to 7680. You can now enter your routine to define a character set. Once run, it can be deleted. The character generator should start at 5120 (and 7679).

Next, type the program which uses the character set, (Poke 36869 205 will switch to the defined characters). To *Save* the program and the new characters type

POKE 44 16.SAVE "(progname)" (return)

When loaded, the program should run as normal using the new character set.

```
READY.

1 REM THE SKELETON,BY
  ASGHAR AHMED , 1982
2 PRINT"[CLR]" A=0 FORT=1TO5
4 PRINT"        /-\"
5 PRINT"        | |"
6 PRINT"        'OO'"
7 PRINT"        \-/"
8 PRINT"        ==="
9 PRINT
10 PRINT"        U"
13 PRINT"     --- ---"
14 PRINT"    C       C"
15 PRINT"    U       U"
16 PRINT"    |--- ---|"
18 PRINT"    | /\ /\ |"
19 PRINT"    | /\ /\ |"
20 PRINT"    | /\ /\ |"
21 PRINT"    | /\ /\ |"
22 PRINT"    | ^/\^ |"
23 PRINT"    | ^| |^ |"
24 PRINT"    | //^\\ |"
25 PRINT"    |/ U \|"
26 PRINT"[CRSR]"
100 READ SL,CL
110 POKESL,31 POKECL,0
120 INPUT"[CRSR]",A$
130 READR$
140 IFA$=R$THENA=A+1
150 PRINT"[HOME]"A"OUT OF"T
160 POKESL,32 NEXTT
702 FORO=1TO1590 NEXT
703 PRINT PRINT"[CLR]"
704 FORI=6TO8
705 PRINT" /----------\"
706 PRINT"| BONE TEST |"
707 PRINT" \----------/"
708 READI$
709 READN$
710 PRINTI$
720 INPUTA$
730 IFA$=N$THENA=A+1
740 PRINT"[CLR][HOME]"A"OUT OF "I
750 NEXTI
800 READ N,S
801 POKE36878,15
802 IFN<0THEN809
803 POKE36876,N
804 FORD=1TO28*S
805 POKE36879,N-25
806 NEXTD
807 POKE 36876,0
808 GOTO800
809 POKE36878,0
810 POKE36879,27 PRINT
    PRINT"IF YOU WANT AN
    OTHER GO PRESS (Y/N)"
820 INPUTB$
830 IFLEFT$(B$,1)="Y"THENRUN
840 PRINT"[CLR]" PRINT"********
    *" PRINT"CHICKEN" PRINT"
    *********" END
2000 DATA7712,38432,CRANIUM,
     7754,38474,ORBIT
2001 DATA7956,38676,HUMERUS,
     7977,38719,RIBS,7860,
     38588 CLAVICLE
2002 DATA"WHAT DOES THE BONE
     NEED IN VAST AMOUNTS",
     "CALCIUM"
2003 DATA"WHAT IS THE
     LUBRICATION FLIUD
     CALLED","SYNOVIAL"
2004 DATA"HOW MANY PAIRS OF
     RIBS ARE THERE","
     TWELVE'
2005 DATA 172,2,181,2,189,2,
     172,2
2006 DATA 172,2,181,2,189,2
2007 DATA 189,2,193,2,200,4
2008 DATA 189,2,193,2,200,4
2009 DATA 200,1,206,1,208,1,
     193,1,189,2,172,2
2010 DATA 200,1,206,1,208,1,
     193,1,189,2,172,2
2011 DATA 172,2,145,2,172,4
2012 DATA 172,2,145,2,172,4
2013 DATA -1,-1

READY.
```

Displayed entries

In part five of our extract from The Working Spectrum *we continue adding modules/subroutines to the Unifile program designed to enable a single program to cover a variety of filing tasks without the need for constant re-writing every time a new use comes along*

Commentary on Module 5

Lines 1680-1720 These lines check that there is room in the file for the new entry

Lines 1730-1830 The binary search is applied to the entries in B$ The search is conducted on the basis of the alphabetical order of the first item in each entry For an explanation of how the Spectrum understands alphabetical order, see page 95 of the Spectrum manual

Line 1730 finds the highest power of 2 which is still less than or equal to the number of entries in the file It uses the logarithm function The search position is set equal to this

Line 1750 T$ is created equal to the first item of the entry in the search position.

Lines 1760-1830 This loop adds or subtracts powers of 2 according to the principles set out in the discussion of binary sorting

Line 1770 FN A was defined in line 1370 It extracts from two characters in Y$ a numerical value which is a pointer to the first character of an entry in the main file

Line 1780 FN A$ was defined in line 1380 It extracts from the main files the item whose indicator is found at position C in B$

Line 1790 This line needs more explanation A condition such as T$>U$ is either true or false but in everyday usage it cannot be said to have a value in the same way that a number or a variable has value For the Spectrum however T$>U$ has a real value which is either 1 if the condition is true or 0 if the condition is false The value of the condition can be used in a program in the same way that a number or a variable can In this particular line if T$<U$ the condition will have a value of 1 and S will have (2 ↑ K)*1 added to it On the other hand T$>U$ will equal 1 and S will have (2 ↑ K)*0 subtracted If T$ had been less than U$ then the roles would have been reversed, while if T$ had been equal to T$ both conditions would have been false and S would not have altered at all

Lines 1810-1820 If S the search position points to one of the dummy entries, these two lines shunt it back into the main body of the data

Lines 1840-1850 Having completed the binary search the item at the selected position is extracted for examination If the item at this position and the new item are equal the new item is numbered after the existing item If they are not equal then the new item is numbered before the existing item

Line 1870 The new entry is added to the end of the file The correct order of the entries in the file is kept only in Y$ Provided that Y$ knows where the 376th entry is, for instance, it is not important that it is actually stored in the 376th place

Testing Module 5

It is difficult to test this module until the search and display function has been added to the program, allowing entries to be displayed with ease You may care to input a few entries and then stop the program to test whether they have been inserted into B$ Remember that they have been inserted in the order in which they were input. You can also examine Y$ with this loop if you wish

```
9999 FOR S = 1 TO LEN Y$ STEP 2 PRINT FN A() NEXT S
```

This will print out the pointer values which you should be able to match up with the beginnings of the entries in the main file

MODULE 6

The purpose of this module is to display entries from the file, either one at a time from the beginning or starting from the first entry which satisfies certain search conditions Having displayed an entry the module gives the user the choice of continuing the search, examining the next entry, changing the entry or deleting it from the file Note the continuous use of FN A and FN A$ to provide the address of an entry and to extract it from the file

Commentary

Line 2200 S is the number of the entry currently being examined It is initially set to 2 because the first entry in the file is actually a dummy

Lines 2290-2380 If the user inputs a search instruction beginning with III the program scans the first item of each entry until it finds one which begins with the character following III If no such item is found the program returns to the main menu

Lines 2390-2420 The special search which searches for any combination of characters specified, regardless of whether it is a whole item or not, is carried out by a separate subroutine which is called up by these lines if the search instruction begins with SSS

Lines 2430-2500 Whole items in the file are examined to see whether they correspond to the item the program has been requested to search for This is much faster than the special search which moves along the file character by character A fast binary search cannot be used since only the first items of each entry are in alphabetical order For this search to be successful the item input must be exactly the same as the item in the memory Searching for Smith J in the file would not find Smith John whereas using special search SSSSmith J would find Smith J or Smith,John but would be much slower

Lines 2510-2570 This section prints out an entry using the subroutine at 2850 which we have already examined

Lines 2580-2740 Having discovered an entry which satisfies the search criteria, the module now offers the user the choice of paging through the file entry by entry searching for the next entry which satisfies the original search criteria or calling up the routine which allows the entry to be altered or deleted

Testing Module 6

You can test the correct functioning of all the search functions with the exception of the special search The amend function has not yet been entered ■

```
2170 REM ************************
2180 REM SEARCH
2190 REM ************************
2200 LET S=2
2210 PRINT PAPER 6;"
SEARCH
2220 PRINT '"COMMANDS AVAILABLE
2230 PRINT '">INPUT ITEM FOR NORM
AL SEARCH"'">PRECEDE WITH "SSS
" FOR SPECIAL SEARCH"'">PRECE
DE WITH "III" TO SEARCH FOR
 FIRST CHARACTER OF ENTRY"'"> E
NTER" FOR FIRST ITEM ON FILE
2240 PRINT "*********************
**********"
2250 PRINT '" INPUT SEARCH ITEM
2260 GO SUB 2780
2270 PRINT S$(2 TO )
2280 LET S$=S$
2290 IF LEN S$=1 THEN GO TO 2510
2300 LET C=FN A()
2310 IF LEN S$<5 THEN GO TO 2430
2320 IF S$(2 TO 4)<>"III" THEN G
O TO 2390
2330 FOR I=S TO N
2340 LET S=I
2350 LET C=FN A()
2360 IF S$(C+1)=S$(5) THEN GO TO
2510
2370 NEXT I
2380 RETURN
2390 IF S$(2 TO 4)<>"SSS" THEN G
O TO 2430
2400 GO SUB 4400
2410 IF C=-1 THEN GO TO 2510
2420 RETURN
2430 FOR I=1 TO X
2440 IF FN A$()=S$ THEN GO TO 25
10
2450 IF FN A$()=CHR$ 0+CHR$ 255
THEN RETURN
2460 LET C=C+CODE B$(C)
2470 NEXT I
2480 LET S=S+1
2490 LET C=FN A()
2500 GO TO 2430
2510 LET C=FN A()
2520 LET C$=""
2530 IF FN A$()=CHR$ 0+CHR$ 255
THEN RETURN
2540 CLS
2550 PRINT "ENTRY ";S-1;" -"
2560 GO SUB 2850
2570 LET S=S+1
2580 PRINT AT 16,0; PAPER 6;"
SEARCH COMMANDS AVAILABLE
2590 PRINT ">""ENTER"" TO DISPLA
Y NEXT ITEM",">""ZZZ"" TO QUIT F
UNCTION",">""AAA"" TO AMEND",">
"CCC" TO CONTINUE SEARCH
2600 INPUT F$
2610 CLS
2620 IF F$="CCC" THEN GO TO 2300
2630 IF F$="" THEN GO TO 2510
2640 IF F$<>"AAA" THEN GO TO 271
0
2650 LET C=FN A()
2670 CLS
2680 GO SUB 1930
2710 IF F$="ZZZ" THEN RETURN
2720 IF F$="AAA" THEN RETURN
2730 CLS
2740 GO TO 2200

                SEARCH

COMMANDS AVAILABLE
>INPUT ITEM FOR NORMAL SEARCH
>PRECEDE WITH "SSS" FOR
 SPECIAL SEARCH
>PRECEDE WITH "III" TO SEARCH
 FOR FIRST CHARACTER OF ENTRY
>"ENTER" FOR FIRST ITEM ON FILE
*********************************

INPUT SEARCH ITEM
```

Twinkle, Twinkle

Keith and Steven Brain present a Singalonga Dragon program

As sales of the Dragon 32 soar at Christmas thousands of bemused mothers will once again be asking the eternal question "It's very nice dear, but what does it do?" As it is Information Technology year we have applied ourselves to this communication problem and devised a couple of programs which illustrate the string handling, sound and high-resolution graphic facilities and show how to train your Dragon to help with the Christmas chores.

Too much singing of carols can be bad for your voice, so what about a program which not only plays the tunes but also displays the words in time to the music? Program 1 *(Singalong)* uses some sneaky string slicing techniques to ease this task.

The words, or rather the individual syllables which are sung on separate notes, are contained within *Data* statements on lines 10 and 20 (not more than 255 characters can be put on a single program line). Spaces between words are included in the data, and the end of a line is indicated by (/).

The tune is contained with A$ in line 30. The format is the usual Dragon *Play* format except that all natural (ie not sharp or flat) notes are preceded by a space. It is necessary to convert all *Play* instructions into two characters in this way, as the *Play* commands (like 02, L2 and T5) are two characters and the slicing technique must treat all information in the same way. Sharps and flats are entered without a leading space as usual (eg B– F+).

X$ in line 40 contains all of the characters which indicate that a note (rather than a change in octave, note length etc) is to be *Played*.

Line 50 steps through A$ two characters at a time by means of *For N = 1 To Len(A$) Step 2* and puts these two characters into B$ by means of *B$=Mid$(A$,N,2)*. *Bb$=Left$(B$,1)* selects the first character of B$ and tests by X=Instr (1,X$,Bd$) if this is an actual note rather than another *Play* command. It is not necessary to define all the possible sharp, natural and flat notes, as naturals are characterised by a leading space and sharps and flats by a letter from A-G.

If B$ is not a note, then line 60 *Plays* the command without printing anything and then returns to take the next two characters. If B$ is a note, then line 70 *Reads* the appropriate syllable from the *Data* and checks by *If Right$(C$,1)* whether it is a (/). If it is not, then B$ is printed with a trailing semicolon.

If the last character of B$ is a (/) then all of B$ except the last character (/) is printed by *C=Len(C$)–1 Print Left$(C$,C)*, followed by a semicolon, and then the print position is moved to the next line by an extra print which is not followed by a semicolon.

So, now we have trained the Dragon to sing carols for us, what about some Christmas decorations? Program 2 *(Xmas 82)* can provide the answer with an interesting demonstration of high-resolution graphics which should certainly impress your relations.

Rather than spoil the surprise, we will leave you to enter the program to find out exactly what is in store, but the following notes explain some of the more devious points in the program.

Line 20 partially superimposes a series of similar objects. Line 40 draws a line in an unused colour to link together these items which are to be *Painted* the same colour.

Line 60 selects random points in an area of the screen around the picture and checks by *Ppoint* if these are set to colour 1. If they are, then it draws a randomised *Circle* at that point in random colour and makes a sound which depends on the co-ordinates. In line 70 there are two sequential *Paint* commands, as the required colour cannot be painted directly.

A drawback of the Rom is that the *Draw* command does not allow you to enter variables in a blank move *(BM)* statement, ie *Bmx,Y* for example. This can be circumvented by first plotting a line of zero length at the variable co-ordinates required (line 100 *Line(X,Y)–(X,Y),Pset)*. This sets the next *Draw* position to those co-ordinates.

If you have nothing to do on Boxing Day, you might like to try linking programs 1 and 2, especially if you are dreaming of a white Christmas.

```
1REM XMAS 82 COPYRIGHT K&S BRAIN
151182

10 PMODE 3,1:PCLS4:SCREEN1,0

20 DRAW"BM50,1":FORN=1TO20STEP2:
DRAW"S"+STR$(N):DRAW"C1BM216E8D5
".NEXTN

30 DRAW"BM50,130C1L2D1DR4U1DL2C3
R5"

40 DRAW"BM50,2C3D25":PAINT(50,14
5),1,1

50 DRAW"BM50,160C2L4D4R2R4U2U8L4
",PAINT(50,176),2,2

60 FORK=1TO500:A=RND(60):B=RND(1
80):C=RND(3)+1:IF PPOINT(A,B)= 1
THEN CIRCLE(A,B),RND(8),C,RND(0)
+0.4:SOUNDA,1

70 NEXTK:DRAW"BM140,140C2R4F5R60
E5L70":PAINT(145,142),2,2 PAINT(
145,142),3,4

80 DRAW"BM150,145":CIRCLE(175,12
5),3,2,1,.43,.89:DRAW"BM139,141C
2R7U":PAINT(175,125),2,2

90 DRAW"BM172,90C1E2R2L4D2L2R2L2
D4R4U2R2U2R2R4R4":PAINT(165,85),
1,1:DRAW"BM172,90F2R4D2E2D2R2E4L
4R2L2D2L2D4R4":PAINT(178,85),1,1
:CIRCLE(170,95),4,4:CIRCLE(174,9
7),4,4:PAINT(170,95),4,4:PAINT(1
74,97),4,4

100 FORN=1TO1000:X=RND(256):Y=R
ND(192):LINE(X,Y)-(X,Y),PSET:DRA
W"S"+STR$(INT(N/30)):DRAW"NCNDRL
NENFNGNH":NEXT N
```

```
1REM SINGALONG COPYRIGHT K&S BRA
IN 151182

10 DATAO ,COME ,ALL ,YE ,FAITH,
FULL/,JOY,FULL ,AND ,TRI,UM,PHAN
T/,O ,COME ,YE ,O ,CO,ME ,YE ,TO
 ,BE,TH,LE,HEM,COME ,AND ,BE,HOL
D ,HIM/,BORN ,THE ,KING ,OF ,A,N
,GELS/,O ,COME ,LET ,US ,AD,ORE
,HIM/

20 DATACOME ,LET ,US ,AD,ORE ,HI
M/,O ,COME ,LET ,US ,AD,ORE ,E,1
M/,CHRI,ST ,THE ,LORD

30 A$ = "O2T5 FL2 FL4 C FL2 D CL
4 A G AB-L2 AL4 G FL2 FL4 E D E
F G AL2 EL4 DL8 CL2 CP4L2O3 CO2L
4 B AL2 B AL4 G A F GL4 EL8 DL4
C F F E F GL2 FL4 C A G AB-L2 AL
4 G AB- A G FL2 EL4 FB-L2 AL4 GL
8 FL2 F"

40 CLS:X$=" ABCDEFG"

50 FOR N=1 TO LEN (A$) STEP 2:B$
=MID$(A$,N,2):BB$=LEFT$(B$,1):X=
INSTR(1,X$,BB$):IF X<>0 THEN 70

60 PLAY B$:NEXT N:RUN

70 READ C$:IF RIGHT$(C$,1)<>"/"
THEN PRINT C$,:GOTO60

80 C=LEN(C$)-1:PRINT LEFT$(C$,C)
:GOTO60
```

Crashed out op art

Last week we looked at Push and Pop and how they can be used to access the machine stack, thus avoiding the use of a subroutine call We also saw how the bytes are transferred from register to memory – the junior byte being loaded first

Conversely

```
LD HL (4105)
```

would have exactly the reverse effect (NB, it codes as 2A 05 41 following the standard convention) Similarly

```
LD HL 1000
```

(an attempt to load *Hl* with the value 1000 hex) encodes as

```
21 00 10
```

so that, even though 1000 is data not an address its bytes get transposed as usual

When a Basic program crashes little harm is done — you can always break out one way or another without losing the program. But machine code crashes are more spectacular and infuriating Spectacular because they often signal their presence by drawing op-art patterns all over the screen and infuriating because (on the ZX81) the only way to break out of them is to pull the power plug out and lose the contents of Ram You want to see a crash to check this? OK try this little program

```
1 REM X
2 POKE 16514 118
3 RAND USR 16514
```

The screen blanks, and the machine no longer responds to the keyboard This is because it uses a Rom routine to scan the keyboard but the Basic operating system is not in use during a *Usr* call of a machine code program Once a crash occurs, you are stuck with it Pull the plug and start again (however, there s no way to alter the Rom contents so don t worry about doing any lasting harm It is you not the ZX81, that will suffer) But there are some simple precautions worth taking

1 Check all machine code listings scrupulously and make sure you have input them correctly
2 *Never* use *Halt* (hex code 76)
3 Make sure that *Calls* and *Rets* match as do *Pushes* and *Pops*
4 Make sure you call the correct starting address
5 Unless there s not much to lose, *Save* what you can on tape before calling *Usr*

Do you remember we said that there is no Z80 multiply instruction? Let s write a subroutine to do the job

First examine the nature of the problem There is no better way of doing that than looking at an example To keep things as simple as possible, we will work in 8-bit registers So, if we want to multiply 9 by 13 it will look like

```
  00001001
× 00001101
```

Now we can treat this as conventional long multiplication, but because it is in binary, it's actually easier than usual If the current digit we re multiplying by is 1, copy the top line — if it s zero, do nothing

```
  00001001   P
× 00001101   Q
  --------
  00001001
  00100100
  01001000
  --------
  01110101
```

Of course we have had to add in zeros on the right at each stage just as we would in a decimal long multiplication In machine code terms, that is equivalent to a shift left We have called the two numbers *P* and *Q*, for reference

While *P* is shifted left, it s also going to be convenient to shift *Q* right, because that way we only need to keep examining the junior bit of *Q* to determine whether to add *P* into the sum or not

Assume that *P* and *Q* are in the *D* and *E* registers The procedure is

```
1  Set the A register to zero
2. If the junior bit of E is  }
   1 then add D into A        }  repeat these
3  Shift D left               }  steps 8 times
4  Shift E right              }
```

Here s a first stab at the code

```
LD A 00
LD B 08
```

The first step is obvious The second sets *B* to act as a loop counter in conjunction with a *Djnz* to come at the end Now we want to test the junior bit of *E* The only way we currently have of doing that is to use a mask pattern (00000001) with an *And* operation, so let s set up the *C* register to that pattern

```
LD C 01      [see table for hex coding]
```

We can only *And* with the *A*-register which will destroy its current contents, so we ll save it in *L* first

```
LOOP  LD L, A
```

then extract the junior bit of *E* and restore the *A* register

```
LD A, C
AND A, E
LD A L
```

If the result of the *And* was zero we need to jump round the add *D* into *A* part of step 2 so

```
JRZ SHIFT
```

Note that since *Ld* does not affect the flags the *Jrz* still refers to the *And* Otherwise perform the *Add*

```
ADD A D
```

Now do the shifts

```
SHIFT  SLA D
       SRA E
```

and see if we ve done the loop enough times yet

```
DJNZ LOOP
RET
```

Below is the whole thing

If you want to try this program out, you will have to arrange for the *D* and *E* registers to hold the values to be multiplied So you could precede the program by something like

```
LD HL, 4300     21 00 43
LDD (HL)        56
INC HL          23
LD E, (HL)      5E
```

and then Poke 4300 (hex) and 4301 (hex) with the values to be multiplied before calling the program These two bytes will, of course be the two zero bytes at the beginning of the routine so the *Ld, Hl,* 4300 will start in 4302

Address		Instruction	Hex code
0000		LD A, 00	3E 00
0002		LD B, 08	06 08
0004		LD C 01	0E 01
0006	LOOP	LD L, A	6F
0007		LD A C	79
0008		AND A, E	A3
0009		LD A, L	7D
000A		JRZ SHIFT	28 01
000C		ADD A, D	82
000D	SHIFT	SLA D	CB 22
000F		SRA E	CB 2B
0011		DJNZ LOOP	10 F3
0013		RET	C9

If you have any machine code subroutines/tips/games, please send them to Machine Code, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF

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Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke*, *PCW*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

NO KNOWN LIST OF POKES AROUND

J Jarret of 4 Honeycroft, Welwyn Garden City Herts writes

Q **I wonder if you could help me with a couple of queries. Firstly, can the *Cap Lock* on the Spectrum be set from software, and if so, how? Is there a complete list of useful *Pokes* anywhere which would help me in programming? Also, if you publish this letter, I am very interested in graphics and so would like to contact anyone in my area who has a micro with user defined graphics.**

A *Caps Lock* can be set by *Poke* 23658 8. This will give an inverted capital C cursor. When you have finished, use *Poke* 23658 0 to reset your computer to normal.

As far as I know, there is no actual list of useful *Pokes* on the Spectrum available, though I am sure that one would, as you say, be very useful. Certainly we at *Popular Computing Weekly* are very interested to hear such things.

GET IN TOUCH WITH ATARI GROUPS

Steve Bates of Leopard Rise Worcester writes

Q **I recently bought an Atari 400 microcomputer. I know very little about its language. Please could you tell me where I can find information on the Atari 400, and on software for it.**

A There is quite a lot of support for the Atari computers and it seems to be growing. There are two user groups. One can be contacted by writing to 'Atari Computer Owners Club' care of Maplin Electronic Supplies Ltd, PO Box 3, Rayleigh, Essex. Another user club is based around the Silica shops and can be contacted at Silica Atari 400/800 users club, 1 The Mews, Hatherly Road, Sidcup, Kent DA14 4DX.

Both clubs have newsletters or magazines. They would probably be the best way for you to make contact with other Atari owners in your area.

One of the advantages of the Atari set up is the large amount of software available on cartridge, cassette and disk. Either of the shops mentioned could supply you with a wide range to choose from.

The only Atari book I have had a chance to look at is *De Re Atari*, which is recommended by Atari and appears to be very good. It is available from both shops and costs around £17.

Atari computers and software are now being carried by the Spectrum group of shops and there is one actually in Worcester — David Waring Ltd, 1 Marmion House, High Street, Worcester. This might be the best place for you to start looking.

ENCOUNTERED PROBLEMS

Alex Ames of High Lorton Cockermouth, Cumbria, writes

Q **It has been stated that it is possible to write a program for the ZX81 directly onto the Spectrum. How? I cannot seem to be able to do it. Can you help?**

A You are not the only person to ask this, but it is quite possible to do. ZX81 Basic is a sub-set of Spectrum Basic in almost all respects. You do not say where you have encountered problems. The only areas to look at are *Peek* and *Poke* because there are some differences in the two memory maps. There is no scroll on the ZX Spectrum, and no *Unplot*. The command *Print At* on the ZX81 only needs the single command *At* on the Spectrum.

If it is not one of these then the only thing that I can think of is that you do not have enough room. That would only be true if you have a 16K Ram pack on your ZX81 and an unexpanded Spectrum. If this was the case then you might be trying to get, say, a 12K program from your ZX81 on to your Spectrum. Unfortunately the Spectrum only has 9K of user Ram, the rest being taken up by the variables, screen map and so on.

ONBOARD 6502 WITH THE TUBE

Anne Cheney of Canvey Island writes

Q **When looking at details on various computers, and trying to decide which to buy, I have seen the word 'Tube' twice used about the BBC micro. It seems important, but I have not seen it on another computer. Could you tell me what it does?**

A The Tube is essentially a way of using a second processor at the same time as using the onboard 6502. If a second processor was connected up then the onboard 6502 would handle the mechanics of the system, such as the keyboard control of peripherals and the video output while the second processor would deal with the actual program.

The second processor does not have to be another 6502. At the moment a Z80 board is being developed by Acorn which among other things would enable CP/M to be used on the BBC micro.

TRANSFORMING CHARACTERS ON THE ZX PRINTER

SD Lang of Bothlin Drive, Stepps Glasgow writes

Q **Recently, after replacing a roll of paper, my ZX printer has taken to printing in double height characters. Can you explain what has happened? Is there a way to select the size of the character you want printed (either in a program or by a switch on the printer)? Or is there something wrong with my printer? I have enclosed an example of the print out before and after.**

A As you say the characters are double height, not double width. If you look closely, you will see that the extra height does in fact come from the blank line that is in between every printed line.

Inside your printer there are two heads that actually spark on to the paper. These are mounted on what can only be described as a sort of caterpillar track. So in every half turn of the track one or other of the heads will scan along the line of the paper. Clearly what has happened is that one of these heads has fallen off, so instead of getting two print lines every turn, you are now getting only one. Unfortunately the paper is moved relative to the head every half a turn. This is how you get the alternate printing.

Because the head must be almost entirely disconnected from the belt it will have to be put back. Inside, the printer is very compact and I would not suggest that you have a go at this yourself unless you have a lot of confidence in your ability to take such things apart.

You have the choice of either sending it back for repair or else keeping it as it is. Although the print is much lighter, I know some people who find the larger size of the characters more than compensates for this. However, it does have the disadvantage of using twice the amount of paper.

Before,

```
  10 LET tip=0
  20 LET score=0
 100 REM  © Bomb Alley © ©
 110 REM  Prog. 28/10/82
1000 REM  [illegible]
```

After

```
  10 LET [illegible]
  20 LET [illegible]
 100 REM [illegible]
 110 REM [illegible]
1000 REM [illegible]
```

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G H Hardy thought that a mathematician, like a painter or poet, was a maker of patterns — if the mathematician's patterns were more permanent than those of the painter or poet, then that was because the mathematical patterns were made with ideas. "The mathematician's patterns, like the painter's or the poet's, must be *beautiful*; the ideas, like the colours or the words, must fit together in a harmonious way. Beauty is the first test; there is no permanent place in the world for ugly mathematics." (*Mathematician's Apology*, revised edition 1967)

I do not think that computing, or computer programming in particular, is a branch of mathematics, but I do believe that programming is essentially a human construction — an exemplification of a human's set of ideas. I also believe that there is no permanent place in the world for ugly programs or ugly programming languages. But, as they say, beauty is in the eye of the beholder.

Start with Basic — a beautiful language (particularly in its original Dartmouth version). The quality of the ideas in that original version have scarce been bettered. Basic was a Beginners All purpose Symbolic Instruction Code, and how well it succeeded. Forget all these people who tell you that Basic is not the best language (for there is no best language in any case) but wonder if any of the languages that have been suggested as replacements are as novel now as Basic was then.

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Another beautiful language is Algol 68, and the beauty of Algol 68 (a language mainly reserved for large main frames) is partly a result of its mathematical structure. Algol 68 has been the only language to make me feel excited when I read its description. It is not easy to explain, but what is so impressive about Algol 68 is the utter simplicity and power of the language (termed 'orthogonality') — even though to produce this simplicity requires a complex system of language analysis by the computer. Simplifying tremendously, the central building block of Algol 68 is called a clause, and every clause produces a result. As long as the result is of the correct mode it is possible to do anything to anything — within the rules.

To be beautiful does not always bring success. Though Algol 68 has its devotees it has not been as successful as that rather ugly language Cobol.

I find Cobol tedious and ugly because it lacks style and has a strange verbosity I find alien. As a working language, however, Cobol has no competitors — most of the world's programs are written in Cobol, and it is estimated that more time is spent running Cobol programs than all other languages put together.

A language which seems to have taken on a new importance is Forth, and when I look at Forth I see a few flashes of beauty in an otherwise rather dull prospect. The beauty of Forth lies in its simplicity and inherent extensibility. Forth has been promoted as an easy language to use with advantages in speed and compactness, and indeed its simplicity in use interactively is beguiling.

But as an improvement on Basic it has too many inherent drawbacks — some of which have been removed with the new Jupiter Ace. One recent Forth version in a non trivial benchmark was only twice as fast as Basic.

Boris Allen ■

Puzzle

The long and the short of it

Puzzle No 35

Concealed in the following jumble of letters is a message which might be thought applicable to this time of year. Although it's not leap year why not try it out after the roast turkey and plum pudding? Now there's a clue if ever I heard one!

NPKNNEOAHG/TPA/R/SASRLO/SITC/PEED/GR/PREYEAE/OUAEEN/PR/IUMMLVOWFS//ETONNGWAYAEYY

Can you decipher it? Once you have found the method to use, a short program might make your task easier.

Solution to Puzzle No 31

In addition to the set given — 192/384/576 — there are four other sets: 219/438/657, 267/534/801, 273/546/819 and 327/654/981. (If 078 is counted as a three-figure number then 078/156/234 may also be included.)

The following program first generates the top number, checks for duplication, multiplies it by 2 and 3 and again checks for duplication.

```
10 FOR H = 1 to 3 20 FOR T = 0 TO 9 30 IF H = T THEN GOTO 260 40 FOR U = 0 TO 9 50 IF U = T OR U = H THEN GOTO 250 60 LET N = H * 100 + T * 10 + U 70 LET A = N * 2 80 LET B = N * 3 90 LET A$ = STR$ A 100 LET B$ = STR$ B 110 IF LEN A$ <> 3 OR LEN B$ <> 3 THEN GOTO 250 120 LET C$ = A$ + B$ 130 FOR M = 1 to 5 140 FOR L = M + 1 TO 6 150 IF C$ (M) = C$ (L) THEN GOTO 250 160 NEXT L 170 NEXT M 180 LET N$ = STR$ N 190 FOR M = 1 TO 3 200 FOR L = 1 TO 6 210 IF N$ (M) = C$ (L) THEN GOTO 250 220 NEXT L 230 NEXT M 240 PRINT N$ A$ B$ 250 NEXT U 260 NEXT T 270 NEXT H
```

Winner of Puzzle No 31

The winner is Railton Frith, Narcot Lane, Chalfont St Giles, Bucks, who provided a solution in Pascal on an Apple III. He receives £10.

Top 10

Atari

1(2)	Jumbo Jet Pilot	(Thorn EMI)*
2(1)	Submarine Commander	(Thorn EMI)*
3(4)	Preppie	(Adventure International)
4(5)	Soccer	(Thorn EMI)*
5(–)	Pac-Man	(Atari)
6(–)	Star Raiders	(Atari)*
7(–)	Air Strike	(English Software)
8(–)	Temple of Apshai	(Epyx)
9(9)	Shamus	(Synapse)
10( )	Alien Swarm	(Inhome Software)

*Cartridge
(Figures compiled by Calisto Computers, Birmingham 021-632 6458)

ZX81

1(2)	Mazeman	(Abbersoft)
2(1)	3D Defender	(JK Greye)
3(5)	Mazogs	(Bug-Byte)
4(7)	Frogger	(DJL Software)
5(–)	3D Monster Maze	(JK Greye)
6(4)	Adventure 1	(Abbersoft)
7(10)	Quip II	(Campbell Systems)
8(3)	Gauntlet	(Cronumatic)
9( )	Flight Simulation	(Psion)
10(6)	Chess	(Artic)

*All require 16K
(Figures compiled by Buffer Micro Shop, London 01-769 2887)

ZX Spectrum

1(4)	Escape	(New Generation)
2(1)	Mazeman	(Abbersoft)
3(2)	Spectral Invaders	(Bug-Byte)
4(–)	Meteor Battle	(Quicksilva)
5(–)	Night Flite	(Hewson)
6(6)	Star Trek	(Chromasoft)
7(5)	Arcade Pack	(C-Tech)
8(10)	Gulpman	(Campbell Systems)
9(8)	Spectrum Chess	(Artic)*
10( )	Espionage Island	(Artic)*

*Requires 48K
(Figures compiled by Buffer Micro Shop, London 01-769 2887)

Vic20

1(5)	Adventureland	(Commodore)*
2(–)	Omega Race	(Commodore)*
3(–)	Rat Race	(Commodore)*
4(1)	Grid Runner	(Llamasoft)†
5(2)	Defenda	(Llamasoft)†
6( )	Night Crawler	(Rabbit)‡
7(3)	Sats	(Commodore)
8(10)	Star Battle	(Commodore)*
9(–)	Avengers	(Commodore)*
10(–)	Voodoo Castle	(Commodore)*

*Cartridge †Requires 8K or 16K ‡3K
(Figures compiled by the Vic Centre, London 01 992 9904)

Books

1(1)	ZX Spectrum Explored *Hartnell*	(Sinclair/Browne)
2(3)	Easy Programming for the ZX Spectrum *Stewart and Jones*	(Shiva)
3(3)	Z80 Assembly Language Programming *Leventhal*	(Osborne)
4(8)	Machine Code and Better Basic, *Stewart and Jones*	(Shiva)
5(6)	Programming the 6502 *Zaks*	(Sybex)
6(–)	The Working Spectrum *Lawrence*	(Sunshine)
7(2)	BBC Micro Revealed *Ruston*	(Interface)
8(–)	Vic Innovative Computing *Ramshaw*	(Melbourne House)
9(7)	Starting Forth *Brodie*	(Prentice Hall)
10(4)	Over the Spectrum, *various authors*	(Melbourne House)

(Figures compiled by Watford Technical Books, Watford (0923) 23xxx)
(Last week's position in brackets)